Cambridge Assessment International Education

Cambridge O Level

ENVIRONMENTAL MANAGEMENT **5014/12**

Paper 1 Theory **October/November 2020**

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 2020 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 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: 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.

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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)	*any three from:* idea of water, stored / contained / held, in reservoir / by dam wall; water moves (down) through, (sluice) gate / pipe; water, rotates / turns, turbine; turbine, rotates / turns / activates, generator (which generates electricity);	**3**
1(b)	*(list rule applied)* *any one from:* loss of land / loss of habitat / deforestation; additional localised flooding; shortage of water further down river; affects fish, migration / breeding; visual / noise, pollution; reduction in CO_2 emissions if switching from fossil fuels;	**1**
1(c)	*any two from:* no water source; climate is not suitable / little rainfall / water frozen; unable to fund; have abundance of other fuel sources, e.g. fossil fuels / solar power; geology / terrain, not suitable;	**2**

Question	Answer	Marks
2(a)	*any one from:* to keep fish in; to keep, predators / other fish, out; to control diet; so fish, live / breed, in their natural ecosystem; to, harvest / monitor, fish easily;	**1**

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Question	Answer	Marks
2(b)	*any two from:* regulation of, mesh size / net design; other species-specific methods, e.g. pole and line; fishing quotas ; closed seasons; protected areas / reserves; conservation laws; international agreements / implementation / monitoring;	**2**
2(c)	*any two from:* parasites / sea lice; disease; habitat destruction; pollution from waste; invasive species; use of antibiotics;	**2**

Question	Answer	Marks
3(a)	exponential / log (phase) ;	**1**
3(b)	*any three from:* increasing / introducing, availability of, family planning / contraception; providing / improving, education on family planning; increasing, career / job / higher education, opportunities for women; encouraging, marriage / children, later in life; improving accessibility to childcare; improving provision of health care; introducing / using, pronatalist / antinatalist, policies; AVP;	**3**

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Question	Answer	Marks
4(a)	respiration; combustion / burning;	**2**
4(b)	(the) Sun / (sun)light;	**1**
4(c)	methane; water vapour;	**2**

Question	Answer	Marks
5(a)(i)	*any two from:* Africa has (ora): more LEDCs / less money, to invest in safe water; fewer safe water sources; fewer water-treatment facilities, e.g. chlorination / desalination ; less water-delivery infrastructure, e.g. pipes, bottling; lower levels of sanitation; more areas of water shortage; more, water pollution / contamination / water-borne diseases; more conflict (restricting access to water);	**2**
5(a)(ii)	*any three from:* aquifers; rivers; lakes; (natural) springs; reservoirs / dams; desalination / treatment / filtration, plants; (stand)pipes; rain(water) (harvesting);	**3**
5(b)(i)	2011;	**1**
5(b)(ii)	Africa;	**1**

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Question	Answer	Marks
5(b)(iii)	fluctuates / no clear pattern / overall decrease (with some outbreaks);	**1**
5(c)	*any two from:* damage to / contamination of / shortage of, fresh water sources; damage to, sewerage systems / infrastructure; damage to / lack of, medical, provision / supplies; lots of people living closely together in temporary accommodation; poor sanitation;	**2**

Question	Answer	Marks
6(a)(i)	(direction of) energy transfer / flow;	**1**
6(a)(ii)	hawk;	**1**
6(a)(iii)	*any one from:* increases as no predators; stays the same because, other predators / hawks, eat them;	**1**
6(b)(i)	*any two from*: provide a, habitat / shelter, for a variety of different, plants / animals; prevent toxins from harming the environment; provide, water / food, source for local organisms; prevent flooding of other habitats nearby;	**2**
6(b)(ii)	provide, income from tourism / ecotourism / incentive to maintain the environment to attract visitors;	**2**

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Question	Answer	Marks
6(b)(iii)	*max five marks for points made from comment bubbles:* *the wetland should be drained because:* provides people with, homes / shops / roads; breeding ground for mosquitoes that spread malaria; *the wetland should not be drained because:* provides a habitat for several rare species of birds and frogs; which may become extinct; reduces the risk of flooding; *plus max five marks for candidate's own valid points:* *additional examples of reasons for draining:* people of the town would benefit / supports the growth of the town; provides other forms of employment; provides better transport links, e.g. for commerce; reduces associated health risks, e.g. malaria; *additional examples of reasons for not draining:* provides, income / employment, for people working there; provides area to grow, rice / food; source of fish to eat; acts as migratory network (for birds);	**7**

Question	Answer	Marks
7(a)	*any two from:* idea of existing rock; (is subjected to) high temperature **AND** pressure; to change (physical / chemical) structure / rock crystals;	**2**
7(b)(i)	40 100 bar line;	**1**
7(b)(ii)	(54 500 ÷ 89 900 × 100 =) 60.6 (%);	**1**

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Question	Answer	Marks
7(b)(iii)	*any two from:* more mechanisation; fewer mines / mines closed / low coal price / poor profitability; concern over danger of working in mines; less demand for coal; cheaper imports available; non-renewable resource / finite reserves / running out; switched to other forms of energy resources; named environmental concern, e.g. climate change, acid rain; government policy;	**2**
7(c)(i)	*any three from:* development of infrastructure; improved, transport links / roads; improved, internet / communications services; improved local economy; increased commerce, e.g. services, shops, hotels; increased tax revenue which could be spent locally; improved, standard of living / quality of life / income; greater access to coal;	**3**
7(c)(ii)	*any two from:* landfill site; nature reserve / public space / park; flood to make a, lake / reservoir; visitor attraction / museum / science centre; other recreational area, e.g. race track, dry ski slope, zip wire; land restoration;	**2**
7(d)	*any three from:* have large reserves (of coal); infrastructure / mines, already in place; industry employs a large number of people in the country; lack of finance for, investment / research in alternatives; cheap imports of coal available; lack of other energy resources, e.g. nuclear, wind, solar;	**3**

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Question	Answer	Marks
8(a)(i)	491;	**1**
8(a)(ii)	axis labels and units; sensible linear scale so graph uses at least half plotting space; points correctly plotted; line joining points;	**4**
8(a)(iii)	yield will stay the same / no increase;	**1**
8(a)(iv)	*(list rule applied)* *any two from:* temperature; amount of rainfall; amount of (sun)light; pests / invasive species; disease;	**2**
8(b)	*any two from:* due to, rain / irrigation; fertilisers dissolve in water; (surface) run-off; infiltration / via ground water;	**2**
8(c)	*any two from:* larger yield per plant, e.g. bigger / heavier / more productive, plants; faster growth / multiple harvests per year; resistant to environmental conditions; drought-resistant; temperature-resistant, e.g. frost-resistant; resistant to, disease / pests; AVP;	**2**

Question	Answer	Marks
9(a)(i)	an area of land covered by water when rivers overflow / owtte;	**1**

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>9(a)(ii)</td><td>any one from:
have fertile soil;
have a layer of nutrient-rich sediment;
store floodwater;</td><td>1</td></tr>
<tr><td>9(b)</td><td>table drawn;
column / row, headings and unit;
4 sets of data recorded correctly;

<table><tr><td>year</td><td>area flooded / km^2</td></tr><tr><td>1987</td><td>57 300</td></tr><tr><td>1988</td><td>82 000</td></tr><tr><td>1998</td><td>77 700</td></tr><tr><td>2004</td><td>70 800</td></tr></table></td><td>3</td></tr>
</table>

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Question	Answer	Marks
9(c)	*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. Responses may lack structure or be in the form of a list. Evaluation may be limited or absent. No response or no creditable response [0 marks]	**6**

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Question	Answer	Marks
9(c)	*Indicative content for:* *'**Small-scale** flooding is a good thing even though damage can occur.'* *benefits of small-scale flooding include:* layers of sediment deposited on land soil becomes fertile less / no, need for additional chemical fertiliser saves on cost of fertilisers reduces environmental impact (of chemical fertilisers) replaces need to irrigate replenishes underground water supplies salt deposited by high rates of evaporation removed by flood water *drawbacks of small-scale flooding include:* potential waterlogging of soil (minor) damage to infrastructure, e.g. potholes in roads, communications lines down makes, travel / transportation / business / work, difficult cost of repairing damage restricts use of mechanisation for farming may delay agricultural operations, e.g. harvesting, sowing possible, overflowing of / damage to, sewerage systems possible pollution of drinking water sources leading to potential disease outbreaks (e.g. cholera) may provide areas of standing water for mosquitoes to breed leading to potential malaria outbreaks	

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