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**ENVIRONMENTAL MANAGEMENT**

**0680/22**

Paper 2

**October/November 2018**

MARK SCHEME

Maximum Mark: 80

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**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 2018 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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This document consists of **11** printed pages.

**PUBLISHED****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.

Question	Answer	Marks
1(a)(i)	<i>any two from:</i> in between the tropics; mainly in southern hemisphere / most between Equator and Tropic of Capricorn; specific continents mentioned; specific countries outside tropics mentioned / location identified;	<b>2</b>
1(a)(ii)	<i>Coffea canephora</i> (circled);	<b>1</b>
1(a)(iii)	<i>any one from:</i> inability to take up (certain) nutrients; do not grow well in soils that are too acid or alkaline;	<b>1</b>
1(a)(iv)	<i>any two from:</i> (the type of) fertiliser added; pH of (parent) rock; pH of rainwater / acid rain; (local) pollution;	<b>2</b>
1(a)(v)	<i>species: (Coffea) canephora;</i>  <i>explanation (any two from):</i> has good cold resistance; will cope with the pH of the soil; has good disease resistance; good / high, yield;	<b>3</b>
1(b)(i)	commercial croplands (circled);	<b>1</b>
1(b)(ii)	(a farming system with) high level of inputs ( fertilisers / pesticides / water / machinery); to produce optimal production / resulting in high yields from an area of land;	<b>2</b>

Question	Answer	Marks
1(b)(iii)	<p><i>advantage:</i> work done faster / more efficiently / less labour needed / able to cultivate previously difficult sites;</p> <p><i>disadvantage:</i> loss of other vegetation (windbreaks) to allow machines to operate / damage to soil structure / increased risk of soil erosion / loss of jobs locally / damage to plants / expensive to purchase / expensive to maintain or fix;</p>	<b>2</b>
1(c)(i)	<p><i>any three from:</i> use of pest resistant varieties; use of natural predators; close management of crops to remove pests as they appear (by hand) / cultural techniques; crop rotation; physical barrier / example of; traps;</p>	<b>3</b>
1(c)(ii)	1.32;	<b>1</b>
1(c)(iii)	<p><i>any four from:</i> risk of residues (left on the beans) harmful to humans; spray drift may impact local, ecosystem / wildlife; run-off into soil water affecting ecosystem; bioaccumulation in the food chain; reduction of beneficial insects (pollinators) in the crop; resistant species will impact on the natural balance; ethical preference;</p>	<b>4</b>
1(c)(iv)	<p><i>any two from:</i> allows the growing of a rust disease resistant crop; identification of rust resistant genes in another species; insertion of gene into (high yielding) coffee species / change to DNA; faster than 'traditional' plant breeding;</p>	<b>2</b>

Question	Answer	Marks
1(c)(v)	<p><i>any three from:</i>            unknown long term effect on, ecosystem / humans;            concerns of genes getting into the, natural / wild population;            expensive technology / unaffordable for many farmers;            religious / ethical, objection;</p>	<b>3</b>
1(d)(i)	<p><i>any four from:</i>            removal of tress reduces, interception / infiltration;            increasing soil erosion;            roots bind soil together;            roots reduce risk of erosion;            loss of habitats / loss of food sources / disruption of food chains / loss of shade for other vegetation;            reduction in biodiversity;            impact on, water table / waterlogging / water cycle;            loss of soil, nutrients / fertility;            desertification;</p>	<b>4</b>
1(d)(ii)	<p><i>any three from:</i>            legislation / preservation orders / fines;            education / help people to understand their importance;            subsidy payments to farmers to retain the trees;            reserves to sustain the habitat;            provide other areas to grow crop;            provide alternative employment;</p>	<b>3</b>

Question	Answer	Marks
1(e)	<p><i>Level of response marked question:</i></p> <p>Level 3 [5–6 marks] Answers will be detailed and well-rounded. The reasons given will be developed. The best answers will include appropriate examples. The response will show a balance of both viewpoints and may also reflect a global viewpoint.</p> <p>Level 2 [3–4 marks] Answers will include ideas and / or reasons that have been developed or explained. They may include a specific example but lack some essential details within the answer. Answer may lack balance within the response and may focus on one viewpoint.</p> <p>Level 1 [1–2 marks] Answers may include a reason(s) presented in a list with little development. There may be repetition or comments not relevant to the question asked.</p> <p>No response or no creditable response [0].</p> <p><i>Level of response marking indicative content:</i> Sustainable agricultural techniques include, plant breeding, integrated pest control, mixed cropping, gene banks, new crop strains, trickle drip irrigation and organic alternatives to inorganic fertilisers. Candidates might include examples or descriptions of techniques that could be used. Many candidates will consider the cost of processes and the fact that farmers need income to invest in new technologies, so it only works if it is profitable. Farmers may not want to change current practices and may lack skills or need to learn new techniques. External / governmental pressure may be needed to change behaviours. Candidates could also include other details of reasons techniques would not be used. The best answers will include the global viewpoint, e.g. the increase in world population and the link to increase in demand for food and increasing production, and considerations such as, the difference between 'small farm' and 'large farm' situations needing different solutions.</p>	6

Question	Answer	Marks
2(a)(i)	100% (circled);	1
2(a)(ii)	<p><i>material:</i> construction materials;</p> <p><i>reasons (any two from):</i>            increase in population;            increase in urbanisation;            improvements to infrastructure (e.g. roads);            more buildings constructed;            increased industry;            (construction materials) harder to recycle;</p>	3
2(a)(iii)	<p><i>any three from:</i>            changes to technologies;            improvements to recycling;            scarcity of resources;            use of other materials / demand for materials;            cost (qualified);            improved mining technology;</p>	3
2(b)(i)	<p><i>any three from:</i>            recycling;            low waste technology / developing cleaner processes and products (at point of production);            example of;            processing waste and industrial products;            example of;            more efficient use of raw materials;            example of;            use of other technologies that do not produce waste;            example of (e.g. switch to renewable resources);            legislation to ban (certain) waste producing processes;</p>	3
2(b)(ii)	28%;	1

Question	Answer	Marks												
2(b)(iii)	<table border="1"> <thead> <tr> <th data-bbox="333 225 465 357">rank</th> <th colspan="2" data-bbox="465 225 1167 288">type of waste</th> </tr> <tr> <td data-bbox="333 357 465 421">1st</td> <td data-bbox="465 357 815 421">organic / biomass</td> <td data-bbox="815 357 1167 421">paper and cardboard</td> </tr> <tr> <td data-bbox="333 421 465 485">2nd</td> <td data-bbox="465 421 815 485">paper and cardboard</td> <td data-bbox="815 421 1167 485">organic / biomass</td> </tr> <tr> <td data-bbox="333 485 465 549">3rd</td> <td data-bbox="465 485 815 549">other</td> <td data-bbox="815 485 1167 549">plastics</td> </tr> </thead> </table> ;;	rank	type of waste		1st	organic / biomass	paper and cardboard	2nd	paper and cardboard	organic / biomass	3rd	other	plastics	2
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1st	organic / biomass	paper and cardboard												
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2(b)(iv)	<p><i>organic waste</i>: decreases as the income of a country increases;</p> <p><i>paper and cardboard waste</i>: increases with increase in a country's income;</p>	2												
2(b)(v)	<p><i>organic waste</i>: low income countries have a large proportion of households involved in agriculture;</p> <p><i>paper and cardboard waste</i>: high income countries have an increase in packaging / purchasing more from supermarkets, which means an increase in paper and cardboard / high use of paper in the home;</p>	2												
2(b)(vi)	<p><i>any three from</i>:</p> <ul style="list-style-type: none"> <li>more employment;</li> <li>health insurance for workers;</li> <li>free meals (for workers);</li> <li>child care;</li> <li>cheap supply of compost as a fertiliser;</li> <li>reduced need for irrigation;</li> </ul>	3												
2(b)(vii)	(addition of a mulch) reduces evaporation from the soil / suppresses weeds;	1												
2(b)(viii)	methane / biogas / biofuel;	1												

Question	Answer	Marks
2(c)(i)	<p><i>any four from:</i>            better insulation in walls;            double glazing of windows;            improved ventilation;            solar panels on roof ( to supply electricity);            rainwater harvesting;            more glazing to reduce need for artificial light;            power from waste;            use of technologies to improve efficiency of use (qualified);            heat recovery;</p>	4
2(c)(ii)	<p><i>any three from:</i>            governments might not see it as a priority;            lack of suitable resources to implement;            abundant supply of energy;            a need to build large quantities of housing is the priority;            economic situation / lack of capital;</p>	3
2(d)(i)	<p><i>benefits (any two from):</i>            cost effective source (compared to alternatives);            does not damage own environment;            lack of own resources;            (good for) international relations;</p> <p><i>risks (any two from):</i>            continuity of supply;            risk of price rises;            dependant on other countries (political issues);            risk of, explosion / accident;</p>	4
2(d)(ii)	<p><i>any one from:</i>            cleaner burning / less pollutants;            less waste products to dispose of;            less bulky to transport;            can be produced from organic matter;</p>	1

Question	Answer	Marks
2(e)	<p><i>Level of response marked question:</i></p> <p>Level 3 [5–6 marks] A full response to the question, giving a balanced approach, utilising a range of different information to support their views. Answers will include different types of waste.</p> <p>Level 2 [3–4 marks] Shows understanding of the issues but lacking in detail or accuracy and often one-sided in approach.</p> <p>Level 1 [1–2 marks] Basic understanding shown. Descriptions and comments are very limited and superficial. Response may be in the form of a list and lacking expansion of the points made.</p> <p>No response or no creditable response [0].</p> <p><i>Level of response marking indicative content:</i></p> <p>Burying waste in the ground may be supported by candidates because it is a cheap way of disposal, the waste can be transported in bulk and you don't need to sort the waste. Some candidates might consider other benefits, for example, it provides opportunities for collection of valuable items by scavengers (which might be lost if burnt), it's a way of restoring old mines, it reduces the dumping of waste into water courses, and there are income opportunities for taking waste for landfill. Some candidates might also consider the opportunities for methane production and collection and that the land may be used for other purposes afterwards, such as agriculture.</p> <p>Candidates might not agree with the statement because large areas of land are impacted, rubbish can blow into surrounding areas there is a risk of pollution to ground water supplies and an impact on local organisms. Some may consider the smell and gas produced. Others may consider the fact that there is a shortage of landfill sites and that some materials do not decompose or will take many years to do so.</p> <p>The best candidates will consider alternatives, for example burning of the waste could be used to generate electricity and as much as possible should be recycled.</p>	<b>6</b>