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**ENVIRONMENTAL MANAGEMENT**

**8291/11**

Paper 1

**October/November 2017**

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.

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Question	Answer	Marks
1(a)(i)	a gas that absorbs infrared radiation / emits heat in the infrared region / is responsible for the greenhouse effect / traps heat in the atmosphere;	<b>1</b>
1(a)(ii)	rising total; accelerating total; increasing contribution from energy and transport; increasing contribution from industrial processes;	<b>2</b>
1(a)(iii)	CO <sub>2</sub> produced by the burning of fossil fuels; in (thermal) power plants; release of methane gas; from gas and oil production processes;	<b>2</b>
1(a)(iv)	4 components correct (2 marks) / 3 components correct; (1 mark) correct scale and label for y axis; (1 mark) valid key; (1 mark)	<b>4</b>
1(b)	carbon dioxide major contributor by volume / % ORA; methane most powerful / greatest warming potential ORA; methane concentration is increasing most rapidly ORA; methane contribution is shorter lived ORA;	<b>3</b>

Question	Answer	Marks
1(c)(i)	<p><b>Description:</b> developed industrialised countries produce highest emissions;  China produces the largest;  'others' category produces only 27% despite their extent and populations;</p> <p><b>explanation:</b> dominance of industrial powers;  reliance on fossil fuels;  reference to ease of use and cost efficiency of fossil fuels;  largest countries so greater demand;  most populous so greater demand;</p>	<b>4</b>
1(c)(ii)	<p>likely future increase in contributions of emissions from NICs;  greater use of relatively abundant coal and other fossil fuels;  reference to ease of use;  making it more difficult to achieve international agreement on reductions;  resulting in continuing greenhouse gas emissions;</p>	<b>4</b>

Question	Answer	Marks
2(a)(i)	because there are 3 components / variables	1
2(a)(ii)	sand 40 silt 40 clay 20	2
2(a)(iii)	<p>a sandy soil</p> <p><b>advantage:</b> warms up quickly;  drains well;  easy to work;  more air trapped;</p> <p><b>disadvantage:</b>  dries out quickly in drought conditions;  often infertile;  minerals leach out quickly;  not rich in humus;</p> <p>a clayey soil</p> <p><b>advantage:</b> retains moisture;  fertile;  rich in humus;</p>	4

Question	Answer	Marks
2(a)(iii)	<p><b>disadvantage:</b> cracks appear in dry conditions;</p> <p>easily waterlogged;</p> <p>heavy to work;</p> <p>less air trapped;</p>	
2(b)(i)	<p>biotic: soil micro-organisms / soil fauna / humus / litter / plant roots;</p> <p>abiotic: weathered rock / mineral particles / calcium / nitrogen / air / water;</p>	<b>1</b>
2(b)(ii)	<p>credit any valid interaction e.g. soil fauna and litter:</p> <p>earthworms; mix humus into the soil; improving the availability of nutrients;</p>	<b>3</b>

Question	Answer	Marks
2(b)(iii)	<p>heavy farm machinery; causes compaction; reduces air passages; damages soil drainage;</p> <p>monoculture; exhaustion of fertility; depletes the soil of vital minerals; weakening structure;</p> <p>overgrazing; compacts soil; reduces plant cover; soil vulnerable to erosion by water / wind;</p> <p>excess irrigation; water logging; results in anaerobic conditions; reducing soil oxygen levels;</p> <p>irrigation; leads to salinisation; makes soil toxic to most plants; reduces crop yield;</p> <p>ploughing; damages soil structure; accelerates erosion; soil loses fertility;</p>	<b>6</b>

Question	Answer	Marks
2(c)	<p>terracing: reduces soil erosion on steep slopes; by building retaining structures parallel to contours; maintaining soil depth; and fertility;</p> <p>contour ploughing: prevents water erosion; allows water to be absorbed by the soil; reduces run-off;</p> <p>planting trees: provides shade; stabilises soil; encourages food chain / soil fauna; influences water content;</p> <p>building earth dams: allows rainwater to be retained; increases soil moisture content locally; allows for irrigation of crops;</p> <p>fencing: allows grazing to be controlled; reduces soil erosion; controls compaction;</p> <p>applying green manure: improves soil structure; soil fertility; prevents erosion when land would be fallow;</p>	<b>3</b>

Question	Answer	Marks
3(a)	<p>coastal erosion, coastal flooding, costal inundation, increasing storm activity, leading to increased salinisation of soil and consequent loss of fertility.  water supply for island population affected.  damage to airport, road links and infrastructure, loss of farmland, jobs and incomes.  depopulation, death and injury in storm, damage to coastal housing.</p> <p><b>Please use descriptor levels 1</b></p>	<b>10</b>
3(b)	<p>The requirements of the question are to:</p> <ul style="list-style-type: none"> <li>• Show an understanding of natural causes</li> <li>• Show an understanding of man-made causes</li> <li>• Assess the relative importance of each</li> <li>• Use evidence from different parts of the world</li> </ul> <p><b>Please use descriptor level 2</b></p>	<b>30</b>



Question	Answer	Marks
4(a)	<p>claims: low carbon, low waste, renewable energy (solar power), energy conservation, water conservation, building design and street layout</p> <p>evaluation: reduced emissions, designs have cooling effects to reduce need for air conditioning, use of solar energy is renewable so sustainable, measures conserve and reduce energy use to be economical and sustainable</p>	<b>10</b>
4(b)	<p>The requirements of the question are to:</p> <ul style="list-style-type: none"> <li>• Show an understanding of the advantages</li> <li>• Show an understanding of the disadvantages</li> <li>• Make an assessment</li> <li>• Use a range of appropriate examples</li> </ul> <p><b>Please use descriptor level 2</b></p>	<b>30</b>

Question	Answer	Marks
5(a)	<p>seismic activity: monitoring the pattern of increasing earth tremors may indicate likely activity, can reference to past patterns of activity.</p> <p>analysis of gas: monitoring emissions of sulphur dioxide, increased emissions are likely to suggest increased activity.</p> <p>measuring ground deformation: bulging of mountain, can suggest increased activity and hint at potentially dangerous eruptions from new vents.</p> <p>using remote sensing imagery: to reveal ash / steam cloud activity / thermal sensing reveals activity, and is safer for the observers.</p> <p>taking geophysical measurements: hydrological changes from groundwater sampling, e.g. loss of water from aquifer / muddy / turbidity changes to the water</p>	<b>10</b>
5(b)	<p>The requirements of the question are to:</p> <ul style="list-style-type: none"> <li>• Demonstrate an understanding of the arguments in support of the idea</li> <li>• Demonstrate an understanding of a counter argument</li> <li>• Make reference to a range of appropriate examples</li> <li>• Come to a balanced conclusion</li> </ul> <p><b>Please use descriptor level 2</b></p>	<b>30</b>

Question	Answer	Marks
<b>Section B part (a)</b>		
<b>Level descriptors 1</b>		
<b>8–10 marks</b>		
The response:		
<ul style="list-style-type: none"><li>• contains few errors</li><li>• shows a very good understanding of the question</li><li>• shows a good use of data or the information provided, where appropriate</li><li>• provides a balanced answer</li></ul>		
<b>5–7 marks</b>		
The response:		
<ul style="list-style-type: none"><li>• may contain some errors</li><li>• shows an adequate understanding of the question</li><li>• shows some use of data or the information provided, where appropriate</li><li>• may lack balance</li></ul>		
<b>1–4 marks</b>		
The response:		
<ul style="list-style-type: none"><li>• may contain errors</li><li>• shows limited understanding of the question</li><li>• shows little or no use of data or the information, where appropriate</li><li>• lacks balance</li></ul>		

Question	Answer	Marks
<b>Section B (part b):</b>		
<b>Level descriptors 2</b> Responses:		
<b>Level one, 25–30 marks</b>		
<ul style="list-style-type: none"><li>• fulfil all the requirements of the question</li><li>• contain a very good understanding of the content required</li><li>• contain a very good balance of content</li><li>• contain substantial critical and supportive evaluations</li><li>• make accurate use of relevant vocabulary</li></ul>		
<b>Level two, 19–24 marks</b>		
<ul style="list-style-type: none"><li>• fulfil most of the requirements of the question</li><li>• contain a good understanding of the content required</li><li>• contain a good balance of content</li><li>• contain some critical and supportive evaluations</li><li>• make good use of relevant vocabulary</li></ul>		
<b>Level three, 13–18 marks</b>		
<ul style="list-style-type: none"><li>• fulfil some requirements of the question</li><li>• contain some understanding of the content required</li><li>• may contain some limited balance of content</li><li>• may contain brief evaluations</li><li>• make some use of relevant vocabulary</li></ul>		

Question	Answer	Marks
	<p><b>Level four, 6–12 marks</b></p> <ul style="list-style-type: none"><li>• fulfil limited requirements of the question</li><li>• contain limited understanding of the content required</li><li>• may contain poorly balanced of content</li><li>• may not contain evaluations</li><li>• make limited use of relevant vocabulary</li></ul> <p><b>Level five, 1–5 marks</b></p> <ul style="list-style-type: none"><li>• fulfil a few of the requirements of the question</li><li>• contain a very limited understanding of the content required</li><li>• are likely to be unbalanced and undeveloped</li><li>• evaluative statements are likely to be missing</li><li>• make no use of relevant vocabulary</li></ul>	