ENVIRONMENTAL MANAGEMENT 8291/12

Paper 1 **October/November 2016**

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.

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This document consists of **13** printed pages.

Question	Answer	Marks
Section A		
1(a)(i)	1008;	**1**
1(a)(ii)	air is moving in a concentric pattern / owtte; except to the south where the circular shape is open; anticlockwise direction; easterly wind north of low / westerly to south; southerly to the east / northerly to the west;	**2**
1(a)(iii)	*Credit one mark for each reason and up to two addition marks for development of the reason.* e.g. rising air; leads to low pressure / frontal activity; rising air cools; condensation occurs; precipitation when the dew point temperature is reached; e.g. humid air is being carried in; from the sea / ocean; by winds;	**4**

Question	Answer	Marks
1(a)(iv)	<table><tr><td>weather condition on 10 May 2010</td><td>Madrid</td><td>Barcelona</td><td>Rome</td></tr><tr><td>the highest maximum daytime temperature</td><td></td><td></td><td>✓</td></tr><tr><td>the greatest temperature range</td><td></td><td></td><td>✓</td></tr><tr><td>the highest precipitation total</td><td>✓</td><td></td><td></td></tr><tr><td>the highest wind speeds</td><td></td><td>✓</td><td></td></tr></table>	4
1(a)(v)	*Award one mark for each change identified.* cloud base lowers; cloud cover increases; rain increasingly likely; reduced daily temperature range / milder temperature at night / cooler by day; wind speed may reduce;	3
1(b)	*Award a maximum of 4 marks for each method.* example content might include: weather satellites: both geostationary and polar orbiting; some positioned within atmosphere; surface temperatures; and pressure systems; storm tracks and associated frontal activity; monitor large areas; scan and relay data that can be turned into images; these contribute to understanding of the weather by revealing cloud patterns;	6

Question	Answer	Marks
	weather balloons: released from ground; reach high altitudes; provide data on atmospheric pressure / temperature / humidity; and wind speed at different altitudes; sent back with the aid of a data-transmission device; weather-monitoring aircraft: typically fly at any altitude up to 10 km; can monitor atmospheric pressure / temperature / wind speeds / turbulence / humidity; in the troposphere; radar stations: can provide data on rainfall intensity; and wind speeds within rain clouds up to approx. 100 km away; ground weather stations: often automated; can provide data on ground and air temperatures / maximums and minimums; sunlight intensity / hours / humidity / rainfall / atmospheric pressure / wind speed and direction; ocean weather ships: can provide data on surface and upper atmosphere weather conditions (as above for ground stations); together with water temperatures; with the advantage of accessing remote locations in the sea; weather buoys: provide automatically collected data; provide data (as above for ground stations);	

Question	Answer	Marks
2(a)(i)	crust is thinner than mantle; crust is cooler than mantle; crust is solid whereas mantle is semi-molten; crust is thinner than mantle; ora	2
2(a)(ii)	hot; ref. to liquid state / molten material; 2200 km thick; contains iron and nickel; dense;	3
2(a)(iii)	convection currents; description of convection, e.g. less dense material rises; driven by heat from the core; radioactive decay; causes movements of tectonic plates;	3
2(a)(iv)	travel times of waves reveals information about the interior of the Earth; refraction / reflection / description of these effects; these occur at boundaries between layers; p waves can pass through solids and liquids; speed of p waves reveals data about the density; data about temperature; data about pressure; s waves cannot travel through fluids; so provide information about the boundary between the inner and outer core (creating a shadow zone); credit correct reference to body and surface waves;	4

Question	Answer	Marks
2(b)(i)	oceanic crust is denser, continental crust is less dense; oceanic crust is thinner, continental crust is thicker; oceanic crust is younger, continental crust is older; oceanic crust has higher magnesium content than continental crust; continental crust has higher aluminium content than oceanic crust; oceanic crust more likely to be basalt; continental crust more likely to be granite; oceanic crust can recycle, continental crust cannot;	3
2(b)(ii)	friction / collision between two moving plates; build-up of stress; sudden release / earthquake; shock waves spread; volcanic activity; produces lava / ash / pyroclastic flows / toxic gasses; damaging structures; causing death and injury; economic losses; loss of crops / food source; possible tsunami; results in coastal flooding;	5

Question	Answer	Marks
Section B		
3(a)	description of pattern: Reference to concentric pattern, spreading out to the west, more high areas north of river, extensions/outliers noted, use of scale and north arrow. factors: These could include population density, building density, land-use (e.g. concentrations of industry, river port, airports), traffic density and prevailing winds. Sources of atmospheric pollution could include combustion of fossil fuels in industry, vehicle use, small-scale domestic use. Reference may be made to specific pollutants, e.g. NO_x and CO_2. Atmospheric pollution management may be in place in low areas, e.g. green spaces, restricted-traffic zones, public transport. **Please use level descriptors 1**	**10**
3(b)	*The question requirements are:* *to discuss arguments supporting the view* *to discuss arguments against the view* *to make reference to examples* *to evaluate the view.* **Indicative content:** A discussion of the necessity of international cooperation. A discussion of the difficulties of international cooperation including disputes between countries at different levels of economic development. Arguments may detail local solutions, e.g. legislation. An evaluation of the evidence for and against the view. Examples of air pollution distribution caused by general circulation patterns, e.g. acid deposition in Europe, global carbon emissions, climate change. Expect arguments in favour of the view, supported by examples of international agreements, e.g. Montreal, Kyoto, Rio etc. **Please use level descriptors 2**	**30**

Question	Answer	Marks
4(a)	Afforestation will improve the nutrient content of the soil of this semi-arid region by adding humus. Soil structure will improve, as will drainage. The wall will also provide shade in a region with high insolation, reduce evaporation and help combat desertification and the possible southward migration (use of north arrow) of the desert shown in the figure. This stabilises the soil, prevents erosion and reduces the impact of winds due to binding of the soil by the roots. Reference could be made to the extent of the planned green wall shown in the figure and to the limits the afforestation plan will impose on the grazing mentioned in the text. **Please use level descriptors 1**	10
4(b)	*The question requirements are:* • *to demonstrate an understanding of the links between agriculture and soils* • *to present arguments in support of the view* • *to present arguments against the view* • *to make use of relevant examples.* **Indicative content:** arguments in favour: Populations in poorer and middle-income countries continue to grow rapidly. Growing wealth in poorer and middle-income countries is raising global demand for food, especially for animal products. This leads to both over intensification of farming and the extension of farmed areas, encouraging soil erosion, compaction and degradation. High agricultural yields are dependent on high inputs of chemicals such as fertilisers and pesticides. arguments against: Technology may come to the rescue. Soil damage can be prevented by management and the use of sustainable agriculture. Aquaculture and hydroponics can be considered as alternatives for agricultural production. There are alternative significant threats to soils, for example climate change accelerating desertification. Sea-level rise and salinisation may be more important. **Please use level descriptors 2**	30

Question	Answer	Marks
5(a)	description: Top five countries are exceeding the sustainable level. The bottom three countries are within the sustainable level. China (and Brazil) are relatively close to/match a sustainable level. Credit manipulation of the data from the graph, e.g. USA consumes around five times the sustainable level, or the UK used over twice the sustainable level. explanation of implications: Inequality of living standards between different countries, the current situation is unsustainable. May lead to conflict over resources. Current situation may not be fair. Living standards in poorer countries can only be improved if richer countries accept limits to their consumption of resources. Comments may be made on specific countries mentioned. Environmental implications may be discussed, e.g. soil and fossil fuel depletion. **Please use level descriptors 1**	10
5(b)	*The question requirements are:* • *to discuss a variety of strategies for more sustainable management* • *to make an assessment of the extent to which these are possible* • *to make reference to examples.* **Indicative content:** A variety of strategies are should be described and explained. Including management of the Earth's fossil fuels, soil, land and water. These should be illustrated with examples of management strategies and an assessment of their success. An example of a sustainable use of land might be agroforestry. Fossil fuels could be replaced with renewables. Sustainable water use through drip-irrigation, rainwater harvesting etc. Answers may refer to the limitations imposed by different levels of economic development, e.g. lack of finance to fund expensive schemes, e.g. hydroelectric power. **Please use level descriptors 2**	30

Section B descriptor levels:

Descriptor	Award Mark
Consistently meets the level criteria	Mark at top of level
Meets the criteria, but with some inconsistency	Middle, mark to just below top mark
Meets most of level criteria, but not all convincingly	Just below middle, mark to just above bottom mark
On the borderline of this level and the one below	Mark at bottom of level

Section B descriptor levels:

level descriptors 1

Level one, 8–10 marks
The response:
- contains few errors
- shows a very good understanding of the question
- shows a good use of data or the information provided, where appropriate
- provides a balanced answer

Level two, 5–7 marks
The response:
- may contain some errors
- shows an adequate understanding of the question
- shows some use of data or the information provided, where appropriate
- may lack balance

Level three, 1–4 marks
The response:
- may contain errors
- shows limited understanding of the question
- shows little or no use of data or the information, where appropriate
- lacks balance

Section B descriptor levels:

level descriptors 2

Responses:

Level one, 25–30 marks
- fulfil all the requirements of the question
- contain a very good understanding of the content required
- contain a very good balance of content
- contain substantial critical and supportive evaluations
- make accurate use of relevant vocabulary

Level two, 19–24 marks
- fulfil most of the requirements of the question
- contain a good understanding of the content required
- contain a good balance of content
- contain some critical and supportive evaluations
- make good use of relevant vocabulary

Level three, 13–18 marks
- fulfil some requirements of the question
- contain some understanding of the content required
- may contain some limited balance of content
- may contain brief evaluations
- make some use of relevant vocabulary

Level four, 6–12 marks
- fulfil limited requirements of the question
- contain limited understanding of the content required
- may contain poor balanced of content
- may not contain evaluations
- make limited use of relevant vocabulary

Section B descriptor levels:

Level five, 1–5 marks
- fulfil a few requirements of the question
- contain a very limited understanding of the content required
- are likely to be unbalanced and undeveloped
- evaluative statements are likely to be missing
- make no use of relevant vocabulary