Cambridge International AS Level

ENVIRONMENTAL MANAGEMENT **8291/13**

Paper 1 **May/June 2017**

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 will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2017 series for most Cambridge IGCSE[®], Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

This document consists of **15** printed pages.

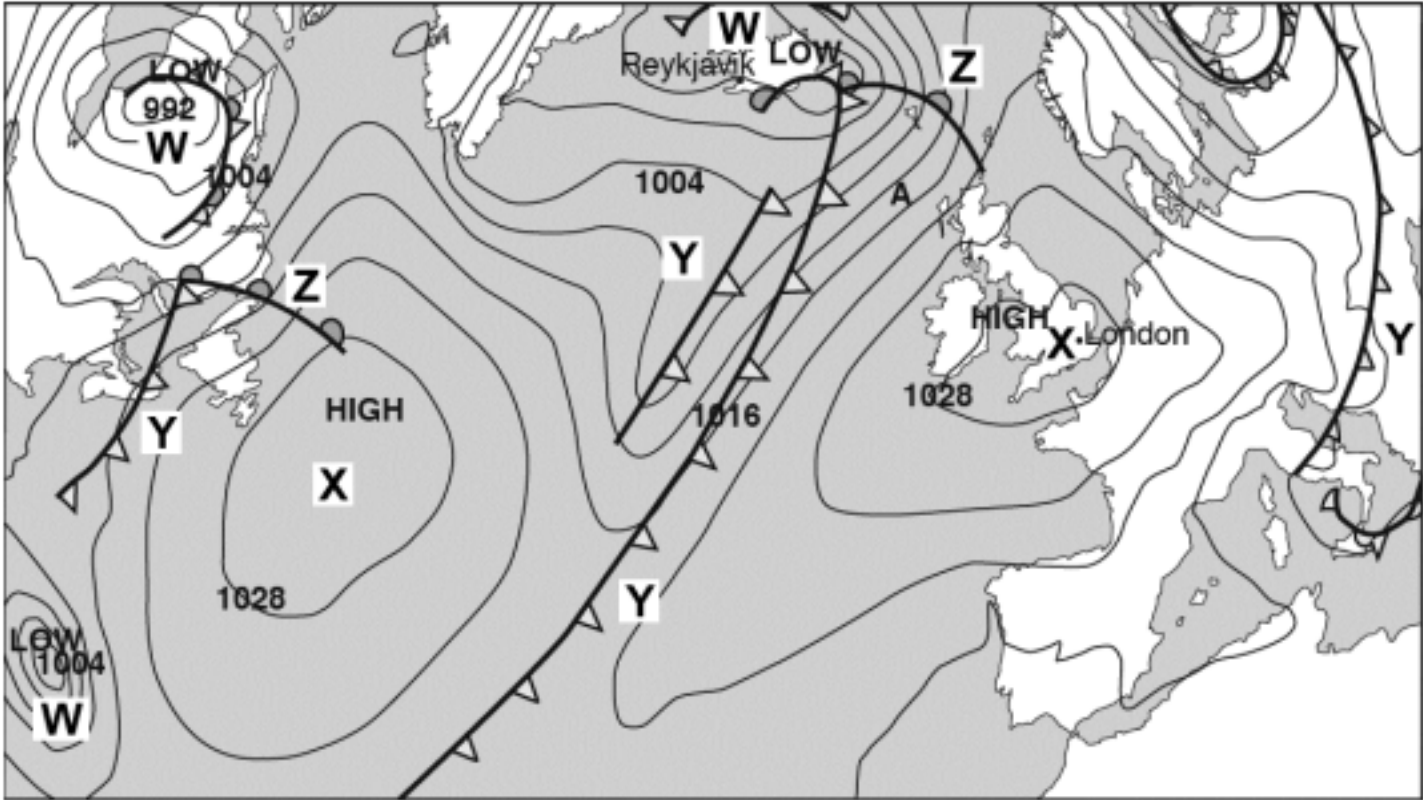| Question	Answer	Marks
1(a)(i)	*Max. two marks per horizon.* *A horizon:* dark upper section; ash coloured (leached) lower part; mix of mineral and organic matter; includes plant material / humus; includes roots; *C horizon:* lighter in colour; weathered parent material; ref. to strong influence of underlying parent rock / close to parent rock; predominantly mineral; little or no organic matter;	**4**
1(a)(ii)	*One mark for horizon and one mark for reason. Allow ECF.* O horizon; presence of dead / decaying organic matter; from surface plants / animals; result of detritivore / other animal activity;	**2**

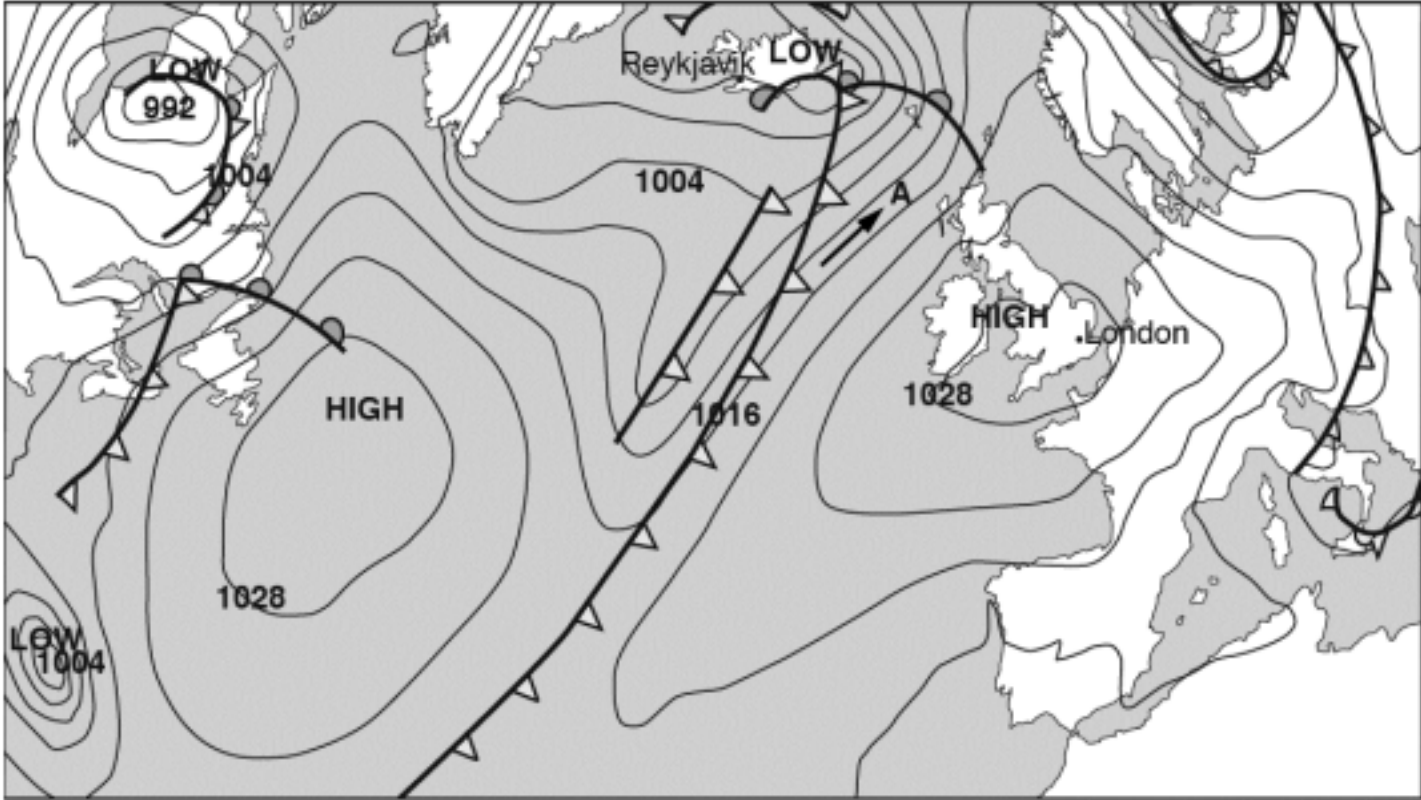| Question	Answer	Marks
1(a)(iii)	*Max. of two marks for each of two ways.* *For example:* *plant litter:* contributes organic matter; which breaks down into humus; providing nutrients; *leaves / stems:* encourage infiltration of rainwater; carry out stem flow; increase soil moisture; increased interception; *roots:* aerate soil; bind the soil; humic acids; draw nutrients / minerals from the soil; extract moisture from the soil; *chemical leachates:* from some plant species; inhibit growth of other plants; *plants attract animals:* likelihood of waste increased; churning / mixing the soil;	**4**

Question	Answer	Marks
1(b)(i)	groundwater contains high content of dissolved salts / minerals; energy from the Sun; leads to high evaporation/transpiration rates; soil water is drawn to surface (by capillary action); high evaporation rates lead to precipitation of salts; around the plant and roots; plants cannot take up water / wither / die; most plants cannot tolerate high salt levels; a hard crust of salt is deposited on the surface of the soil;	**4**
1(b)(ii)	sub-surface drainage; to lower the water table; reducing evaporation; salinity stays low; apply large amounts of water periodically; dissolves surface salts; these wash away; leaching of sub-surface salts; use strip cropping methods / agroforestry / eq.; reduces exposure of soil surface; to reduce evaporation; grow plants such as perennial tussock grasses; which facilitates water infiltration; and flushes the salts downwards; apply gypsum and fertilisers; to counteract salts; to improve plant growth; plant growth removes salts;	**6**

Question	Answer	Marks
1(b)(ii)	ploughing; keeping the soil churned; keeps the surface salt free; redistributes the salt away from the surface; mulching / plant residues used; reduced evaporation; reduced movement of salts; minimum / managed irrigation / trickle-drip irrigation; reduced evaporation; reduced movement of salts; leave salt to accumulate; harvest salt; re-use land at later stage;	

Question	Answer	Marks
2(a)(i)	North West Pacific;	1
2(a)(ii)	2010;	1
2(a)(iii)	fluctuating pattern / general rise and fall; identify above / below average years / anomalous years; accurate use of data to support answer;	3
2(a)(iv)	variations in ocean temperatures; warm water supplies the energy for cyclones / eq.; ocean circulation; variations in global temperatures; short-term changes, e.g. El Niño; results in water temperature differences;	2

Question	Answer	Marks
2(b)(i)	*One mark for each letter positioned correctly.* *Example positions shown.* 	**4**

Question	Answer	Marks
2(b)(ii)	*Accept deviation towards the high or low.*	1
2(b)(iii)	warm; humid / damp / moist; *Accept correct ref. to density of air.*	2

Question	Answer	Marks
2(b)(iv)	*Reykjavik:* cloudy; strong winds; cool; heavy precipitation; *London:* clear skies; light winds / calm; warm (daytime) temperature; lack of precipitation;	**6**

Section B

Question	Answer	Marks
3(a)	*description:* symmetrical pattern around mid-ocean ridge, pattern less symmetrical at south Atlantic junction. Progressive ageing of rocks away from the ridge, oldest close to South America / Africa, youngest in mid-Atlantic. Reference may be made to the jigsaw fit. *explanation:* ocean floor spreading, continental drift, upward convection currents in mid-ocean, plates moving apart slowly, volcanic activity followed by magma solidifying to produce new rock. **Please use level descriptors 1**	**10**

3(b)	*The question requirements are:*
	   • *refer to examples of volcanic hazard events*
	   • *describe and explain a variety of management strategies*
	   • *make an assessment of the management strategies.*
	
	Indicative content:
	
	Answers are likely to refer to examples of the following hazards: lava flows, ash clouds, pyroclastic flows together with secondary hazards such as lahars and assess their probable impact.
	
	Management strategies are likely to include aspects of prediction, monitoring, planning and response. Answers should consider evacuation plans, monitoring and early warning, provision of emergency aid, education of population etc.
	
	Answers should be able to assess the likely effectiveness of such strategies and to consider how the areas involved may provide special challenges due to, for example, remoteness and level of economic development.
	
	Please use level descriptors 2
		30

Question	Answer	Marks
4(a)	*description:* converging lines, more varied energy mix in the future, decline in oil, rise of renewables since 1990 appearance, predicted decline in coal, rise of gas, rise in nuclear pre-1990/stable since and hydro stable. Data points may be used to support descriptions. *reasons:* depletion of fossil fuels, concern over carbon dioxide emissions, promotion of renewables (tax policies etc.) and fears about nuclear safety. Likelihood that main sites for hydro have been exploited already. Relevant international treaties may be referenced and carbon footprints. **Please use level descriptors 1**	**10**

4(b)	*The question requirements are:*
	  • *to demonstrate an understanding of an affordable and sustainable energy supply*
	  • *to describe and explain a variety of different energy policies adopted by countries*
	  • *to provide an explanation of the reasons for the different policies adopted.*
	
	Indicative content:
	
	Reasons might include: access to natural resources such as large rivers, lots of sun, or very windy, the level of economic development and the likely contrasts between developed and emerging economies, available technologies, comparative costs of fuels, fuel security concerns, existing energy infrastructure, political issues and the will to create major projects. Countries may have large reserves of fossil fuels which they wish to exploit.
	
	Examples will vary but should allow a contrast between different energy policy approaches.
	
	Please use level descriptors 2
		30

Question	Answer	Marks
5(a)	Carbon dioxide is generated on a large scale from human industrial activities such as power stations, industry and transport. In contrast methane comes mainly from agricultural sources, fossil fuel retrieval, processing and distribution as well as waste treatment. Comparison can be made at the residential and commercial level where carbon dioxide has almost three times the contribution of methane, land use and biomass burning, in which methane is about a third smaller, and fossil fuel retrieval in which methane is more than three times greater. Reasons should refer to the different nature of the chemicals and how carbon dioxide is a waste product of combustion processes and methane is a product of fermentation and is also released as a gas through processes involving fossil fuels including extraction and transport, as well as being the chief component of natural gas. Reference could be made to methane-producing microbes releasing the gas as a waste product in landfills. **Please use level descriptors 1**	10
5(b)	*The question requirements are:* • *to demonstrate an understanding that pollution is a global issue with global consequences* • *to demonstrate knowledge and understanding of international agreements and protocols aimed at tackling global warming* • *to evaluate their degree of success.* **Indicative content:** Answers should provide a range of relevant international agreements, e.g. Rio, Kyoto, Bali, Paris. The problems encountered in achieving agreement should include the fact that countries with different levels of economic development have different priorities, different economic structures (balance between industrial and agricultural), access to green technologies (affordability), vulnerability to climate change, political views / interpretations of evidence. Reference may be made to the likelihood of the USA withdrawing from Paris agreement and possible consequences. **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

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