Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

ENVIRONMENTAL MANAGEMENT **0680/22**

Paper 2 Management in Context **May/June 2019**

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.

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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.

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Question	Answer	Marks
1(a)(i)	*any three from:* no roads through the centre / limited transport / only one airport; central area is an area, with unused land / that has no useable land; (central area has) glaciers / permanent ice / snow; coastal areas have, fishing ports / towns; coastal areas used for, farming / grazing / agriculture; people live where food can be, grown / produced; (most of the) land is infertile / can't be used for, farming / grazing / agriculture; climate is not suitable / too extreme;	**3**
1(a)(ii)	*allow answer within range* 167 000–168 000;	**1**
1(a)(iii)	*any three from:* comparison of males and females, e.g. more female than male from 70 / very little difference in male and female / more males born than females; high percentage, young (dependents) / quoted data, e.g. 0–29; over half / most, of the population, between 15–64 / quoted data; 25–54 highest total percentage / quoted data, e.g. age group with largest number is, 20–25 / 25–29 / 20–29; numbers decrease from 60–64 / decrease after 60 or 65 / ORA; quoted data for one bar, e.g. 0–4 almost 12 000 males whereas fewer than 12 000 females;	**3**
1(a)(iv)	any two from: conflict / refugees; economic / employment; family; *idea of* wanting a change or wanting the 'Icelandic' way of life / wanting better living conditions; natural disasters or named natural disaster, e.g. famine / drought / tectonic activity; education;	**2**
1(b)(i)	3.4 °C max temperature plotted –1.2 °C min temperature plotted 72 mm precipitation plotted as bar **AND** shading matches key **AND** width of bar matches other bars *all 3 correct = [2]* *2 correct = [1]*	**2**

Question	Answer	Marks
1(b)(ii)	*max two information from:* cold or low temperatures / quoted temperature data; (in summer) low precipitation levels / quoted precipitation data; *max two explanations that link to information from:* ground frozen; crops, die / damaged / will not grow / slow to mature / inadequate seed development (at low temperatures); low rate of photosynthesis or respiration; short growing season; soil, water-logged / prone to drought;	**3**
1(c)(i)	*any three from:* takes too long to, grow / produce (bananas); can't be grown outdoors / have to be grown in greenhouses; greenhouses (need artificial lighting or heating so) large amount of energy; cost a lot to grow / cannot be competitively priced; no surplus to sell / large number imported / quantity grown is small;	**3**
1(c)(ii)	*any two from:* (crop) rotation; fertilisers; (improved) irrigation; insect control / use of insecticide; weed control / use of herbicide; fungi control / use of fungicide; mechanisation; selective breeding (of animals or plants); genetically modified (GM), organisms / crops;	**2**
1(d)(i)	*any four from:* *idea of use of* hot (ground)water from rock cracks / hot water from volcanic areas / hot water from rocks that contain (decaying) radioactive elements; hot water turns to steam; steam, turns / drives / moves / runs a turbine; turbine, turns / drives / moves / runs a generator (which produces electricity); cold water forced into rocks or underground / hot water cooled (in cooling tower) is returned to rocks;	**4**

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Question	Answer	Marks
1(d)(ii)	biofuel / bioethanol / biogas / biomass / wood / hydro-electric / tidal / wave / solar / wind;	**1**
1(d)(iii)	*any four from:* *agree with statement because:* (geothermal) does not produce, carbon dioxide / greenhouse gases / named greenhouse gas (at point of use); does not contribute to, global warming / (enhanced) greenhouse effect / climate change; does not produce, sulfur dioxide / SOx / NOx (at point of use); does not contribute to acid rain; renewable energy resource / no raw materials used / only water used; stated impact of climate change, e.g. melting ice caps, sea level rise, extreme weather, disruption of habitats; stated impact of acid rain, e.g. acidification of lakes, defoliation, rock weathering; *disagree with statement because:* rocks (may) need to be, cracked / fractured; geothermal can only be used in certain areas; (technology for) geothermal power station is expensive (to set up);	**4**
1(e)(i)	*allow answer within range* 82–83;	**1**
1(e)(ii)	*any two from:* (graph doesn't give information on) production and export / (economic) income and output / profits / value of goods; other industries use more or less electricity but make more or less money (from goods); (graph doesn't give information on) size of industry / number of people employed; (graph doesn't give information on) fuel used in, agriculture / fishing;	**2**
1(f)(i)	*allow answer within range* 32–38;	**1**
1(f)(ii)	*any one from:* from, lake / river; desalination; build a dam; pipeline; ground water / bore hole / artesian well;	**1**

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Question	Answer	Marks
1(f)(iii)	*any two from:* example of how the smelter might affect the local environment, e.g. loss of biodiversity / loss of habitat / how to obtain freshwater / effect on lake; to find out people's view; named safeguards in place whilst being built, e.g. infrastructure planning / suitable area to put electricity supply or pylons; named safeguards in place once operating, e.g. maximum output / emissions standards / waste management; legal requirement (to have an EIA); remediation on closure / end of life plan;	**2**
1(f)(iv)	*any two from:* *no because,* there are no questions directly about expanding the aluminium industry; the questions are leading or biased; the questions are not clear; *yes because,* the 'no' responses are low **OR** high response yes, for questions 1 or 2 (employment / wealth); high response 'no' to question 3 (relying on fishing and tourism) / ORA;	**2**
1(f)(v)	*any two from:* did not use, random or systematic sampling / only asked aluminium workers / not representative of population; the people asked have a vested interest in the industry expanding / people were biased; no information on the number of people questioned / response rate may be low;	**2**
1(g)(i)	table drawn with, column / row headings; units correct (m for distance **AND** mg / kg or mg per kg for fluoride); 3 sets of data recorded correctly;	**3**
1(g)(ii)	no **AND** maximum crop level is 21 (mg / kg), which is below the safe level of 30 (mg / kg);	**1**

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Question	Answer	Marks
2(a)(i)	*allow **X** marked anywhere on, Mid-Atlantic Ridge / shaded area;*	**1**
2(a)(ii)	constructive;	**1**
2(a)(iii)	*any two from:* mainly on the (Mid-Atlantic) Ridge; one, on ridge of south coast / in sea / on a (separate) island; three not on ridge / seven on ridge; larger number in south; none (on ridge) near, capital city / Reykjavik / airport;	**2**
2(b)	*any two from:* people could ignore, the rules / buffer zone; water pollution can enter the buffer zone; air pollution can enter the buffer zone; lack of, surveillance / patrols / security (protecting buffer zones); no fines or punishment for entering buffer zone;	**2**

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Question	Answer	Marks
2(c)(i)	*any four from:* *explanation of how ash in air created air pollution:* ash caused, air pollution / acid rain / reduced visibility; *examples of effect on farming:* ash means, animals can't graze / nothing for animals to eat; ash means plants can't grow; ash blocks out light or plants can't photosynthesis; *examples of damage caused by the rapid melting of snow, leading to flooding:* flooding caused waterlogged soil; flooding washed crops or soil away; flooding washed roads away; flooding means harvest will fail or be poor; people / animals, have to be moved; flooding will improve soil fertility due to silting in long term; *examples of effect on health:* ash causes breathing problems; lack of food for humans or animals, as crops fail; *examples of economic impact:* ash disrupted travel causing loss of, business / income / tourism; increased costs of, rescue / medical expenses / food; loss of, income / livelihood for farmers; damage to, homes / properties / infrastructure;	**4**
2(c)(ii)	*any two from:* lots of low VEI eruptions / VEI 2 has most eruptions; more low VEI than high VEI / as VEI increases frequency decreases / ORA; no VEI 8 or VEI 1 or VEI 0 shown; quoted data, e.g. VEI 7 has least number of eruptions;	**2**

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Question	Answer	Marks
2(c)(iii)	*any four from:* more people live in Indonesia / more densely populated areas / more dispersed population; (eruption occurred at) different time of day; Indonesia or LEDC, doesn't have money to spend on disaster preparation / different (economic) priorities (on how to spend money) / has poor infrastructure / ORA; *in Iceland (more) efficient,* monitoring / prediction; early warning (systems); land use zoning; *Iceland disaster preparation:* education (on what to do during an eruption); disaster plan; drills; emergency supplies / provision of, water / shelter / food / medical supplies; (trained) rescue (teams); evacuation (procedure);	**4**
2(c)(iv)	*any three from:* nowhere else to go; economic / financial, constraint; family or ancestral ties / tradition(al way of life); good early warning systems / enough time to evacuate; good, prediction or monitoring systems; mineral wealth; (employment in) tourism; fertile land / soil rich in nutrients / employment in agriculture; geothermal energy or power / ready supply of energy; scientific research / science;	**3**

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Question	Answer	Marks
3(a)(i)	*any one from carbon capture:* carbon absorption by photosynthesis / use of carbon dioxide to make glucose or in photosynthesis; photosynthesis equation, e.g. carbon dioxide + water → glucose + oxygen; growing forests act as sinks / *idea of* CO_2 or carbon 'locked' or sequested in the younger trees; *any one from carbon storage:* mature forests or older trees store carbon (in trunks); trees live for many years / *idea of* long-term storage of carbon;	**2**
3(a)(ii)	*any two from:* over cultivation; overgrazing; trampling; AVP, e.g. poor irrigation / poor waste-water disposal / construction of dams or reservoirs / mining / road construction / building homes / logging machinery / urbanisation ;;	**2**
3(a)(iii)	*any three impacts from:* loss of habitats; loss of biodiversity / reduction in plant or animal populations; leaching / infertile soil; desertification; plants cannot grow / crop failure; livestock death / livestock can't graze or feed; silting of rivers; flooding; displacement of people; food shortages / malnutrition / famine; salinisation;	**3**

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Question	Answer	Marks
3(b)	*both benefits and negative impacts must be covered for maximum credit:* *maximum three from, benefits:* (Alaskan lupine plant) reduces soil erosion / (root structure) binds soil / (root structure) creates an anchor; (returns nitrogen to soils which) improves soil, quality / fertility / structure; improves crop yield; has economic benefit (as can be used as a medicine or has other uses); *maximum three from, negative impacts:* (Alaskan lupine plant) competes with native plants; native plants do not grow well in shade (of lupine) / lupines block sunlight or reduce photosynthesis (of native plants); lupine is not controlled by grazing (as bitter taste); reduction in land available for grazing (as grazing animals do not eat lupin); cannot be used to feed sheep or goats or animals / grazing animals may go hungry (as cannot be grazed on lupin grown land) / grazing animals feed on native plants;	**4**
3(c)(i)	*any three from:* use a transect or description of transect, e.g. length of string or tape measure in a straight line; (transect) placed at random or systematically in the field / or known compass bearing / or known starting point; count all the plants, along the transect / or at regular intervals; record results in a suitable format, e.g. table or tally (chart); repeat the transect / repeat in different positions in same field; calculate the average number of plants and scale for whole field;	**3**
3(c)(ii)	*any two from:* temperature (of air or soil); pH (of soil); light (intensity); moisture (content of soil); humidity; oxygen; carbon dioxide; salinity;	**2**
3(c)(iii)	determine (average) number of lupine per m^2 or per unit area; multiply by stated area of Iceland / multiply by stated unit of area of Iceland, e.g. km^2, m^2;	**2**

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