Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

ENVIRONMENTAL MANAGEMENT **0680/41**

Paper 4 **October/November 2017**

MARK SCHEME

Maximum Mark: 60

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 2017 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

Question	Answer	Marks
1(a)(i)	1 677 000;	**1**
1(a)(ii)	25.8(%);; *(if answer incorrect, allow one mark for 1 677 000 ⁄ 6.5 [1])*;	**2**
1(a)(iii)	Nashville, Memphis, Knoxville, Chattanooga; cities correctly paired with their population (659 000, 656 000, 185 000, 177 000);	**2**
1(b)(i)	*any two from:* soil type; pH; planting density / number of plants / eq; size of plots; species / variety / type / strain / breed of maize; fertilizer; pesticide; water (schedule) / eq; AVP;	**2**
1(b)(ii)	as a control experiment; to compare (with the other treatments);	**2**
1(b)(iii)	*any three from:* *plot A:* plants / crops are shorter / smaller; shorter / smaller cobs; lower yield; *differences calculated:* 26 cm difference; 0.6 cm difference; 0.3 tonnes difference;	**3**
1(b)(iv)	6.8(%);; *(if answer incorrect, allow one mark for* 6.3 – 5.9 = 0.4 (/ 5.9) *[1])*;	**2**

Question	Answer	Marks
1(b)(v)	*any two from:* repeat the trial; use, more plots / more samples; on different farms; use other varieties of maize; measure plants again;	**2**
1(c)(i)	*any two from:* sample too small / should look at more plants; in only one part of the field / eq; yellow spots could be caused by other things;	**2**
1(c)(ii)	*any four from:* *ref to* a systematic or random method; transect laid out / eq; stated sample points; number of samples; random method, e.g. grid co-ordinates; use of, random tables / random number generator / eq; use of quadrats; size of quadrat; further detail, e.g. sample within the quadrat;	**4**
1(c)(iii)	*any two from:* saves time; saves fuel; less wheelings / eq; AVP;	**2**

Question	Answer	Marks
2(a)(i)	*any two from:* switchgrass, is a renewable crop / can be replanted / eq; does not need (added) zinc; idea of carbon neutral / carbon neutral described / little contribution to, global warming / greenhouse gases;	**2**
2(a)(ii)	*any three from:* transport costs low; labour costs low; more carbon neutral due to shorter distance / less air pollution / eq; (transport is) not time consuming / easier / eq;	**3**
2(a)(iii)	*any three from:* less food for animals; so less meat production; for humans / humans eat maize / eq; switchgrass grows well in, poor / zn deficient soils / ORA; ethanol can be made from, other crops / wastes / eq; maize can be exported;	**3**
2(b)(i)	198 AND 91;	**1**
2(b)(ii)	*any two from:* higher costs of production / profit per dollar invested only slightly more; calculations to show this, e.g. switchgrass is 25 cents on the dollar and hay is 20 cents on the dollar; hay may be more use to them / switchgrass not a fodder crop / eq; AVP;	**2**

Question	Answer	Marks
2(c)(i)	*one mark for a valid method and one mark for further detail:* systematic; e.g. from a list of all farms choose every e.g. tenth; random; e.g. from a list of all farms choose sample using random number generator; stratified / quota; e.g. choose a sample based on the, size / type of farm / choose number of farms of each type according to the number of each needed; self-selection / volunteer; e.g. advertise for farms to volunteer for the survey;	**2**
2(c)(ii)	*any two from:* much quicker; reduces, travel costs / cost of carrying out survey; AVP, e.g. a different answer might be given over the phone;	**2**
2(c)(iii)	subsidies / tax break / provide seeds / eq;	**1**
2(c)(iv)	*any three from:* biofuel comes from the photosynthesis of plants / plants take in CO_2 / eq; so carbon released is the same as carbon captured / carbon neutral; less fossil fuels are, used / burnt; a reduction in the additional carbon dioxide added to the atmosphere / less greenhouse gases released;	**3**

Question	Answer	Marks
3(a)	*any three from:* bacteria fix nitrogen; from the air; decomposition (of dead plant material / organic matter); humus added to the soil; nutrient cycling; better soil structure / drainage;	**3**
3(b)(i)	orientation with linear scale; *axes labelled:* average length of maize roots / mm; zinc concentration / ppm; plots correct;	**4**
3(b)(ii)	negative correlation / as Zn concentration increases root length decreases;	**1**
3(b)(iii)	28(mm); shown on graph;	**2**
3(b)(iv)	*any three from:* long roots absorb, more minerals / nutrients from deeper down; (long roots) so more growth / yield; also (absorb) more water; so less likely to die in hot weather; crops less likely to fall over / more resistant to wind; bind soils better / less soil erosion;	**3**

Question	Answer	Marks
3(c)	*any four from:* remove, waste tips / chemical waste; fill holes with suitable material, e.g. infill / landfill / mining / seal the mine; waste / overburden / water; add topsoil; add fertiliser; cover with, trees / grass / plant species; grow plants that absorb toxic metals (and remove the plants); landscaping / reprofiling; to reduce drainage of toxic substances into water courses;	**4**