ENVIRONMENTAL MANAGEMENT **0680/43**

Paper 4 **October/November 2017**

MARK SCHEME

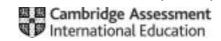Maximum Mark: 60

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.

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This document consists of **6** printed pages.

Question	Answer	Marks
1(a)(i)	185 000;	**1**
1(a)(ii)	2.8(%);; *(if answer incorrect, allow one mark for 185 000 ÷ 6.5 [1])*;	**2**
1(a)(iii)	Gibson, Dyer, Weakley, Henry, Obion; counties correctly paired with their population (50 000, 38 000, 34 000, 32 000, 31 000);	**2**
1(b)(i)	*any three from:* legumes fix nitrogen; in root nodules; can grow in nitrogen poor soils; further details such as bacteria present; named bacteria;	**3**
1(b)(ii)	*any two from:* soil structure not damaged by ploughing; still covered in crop residue; reduced surface run-off; reduced (wind / water) erosion; new plants hold soil together;	**2**
1(b)(iii)	saves on, time / fuel / labour costs / wear and tear on machinery;	**1**
1(c)(i)	suitable linear scale; *axes labelled:* price / USD; year; plots correct;	**4**
1(c)(ii)	overall increase in value (until 2012); then decrease (to 2015);	**2**

Question	Answer	Marks
1(d)(i)	some will not, germinate / grow / eq; some will be eaten / die;	**2**
1(d)(ii)	17.62(%);; *(if answer incorrect, allow one mark for 137 345 ÷ 779 320 (× 100) [1])*;	**2**
1(d)(iii)	*any three from:* less seed needed / lower cost of seed; higher survival rate of seedlings to final plants; correct reference to the effect of competition; lower density only has small reduction in yield/eq; use of figures to support ideas;	**3**
1(e)(i)	*any two from:* one sample may not be representative / eq; cannot find an average; AVP, e.g. reason why it is not representative;	**2**
1(e)(ii)	3 to 4 correct positions for two marks;; 1 to 2 correct positions for one mark;	**2**
1(e)(iii)	18.7; 3;	**2**
1(e)(iv)	*field area* **C** AND *quadrat number* 3;	**1**
1(e)(v)	*any one from:* seeds not planted / eq; compacted soil so not germinated; AVP, e.g. weeds kill plants; disease; *ref to* competition;	**1**

Question	Answer	Marks
1(f)(i)	*any four from:* *ref to* more profit / lower costs of seed; not (locked in to) buying seed each year/eq; can change variety of seed; choice / wide range of herbicides / eq; high(er) demand for non-GM; AVP;	**4**
1(f)(ii)	*any two from:* weed problem will be worse / output lower /eq; resistance could pass from crop to weeds; by pollination / eq; need to develop new herbicides; *ref to* superweeds;	**2**
1(g)(i)	*any two from:* using up finite fuel source; *ref to* specific air pollutants, e.g. CO_2; NOx; sulfur emissions; particulates / smoke; human health, e.g. *ref to* asthma / lung cancer;	**2**
1(g)(ii)	*any two from:* *idea of* sustainable fuel supply; further detail; less NOx / particulates so less damage to human health; less contribution to, climate change / global warming;	**2**

Question	Answer	Marks
2(a)	*any six from:* description of a control experiment; different / stated, quantities of fly ash; same quantity of, seeds; soil; some replicates; plants kept in the same conditions; details of measurements taken from plants; timed intervals; record data; AVP;	**6**
2(b)(i)	*any four from:* making use of a waste; so preventing more (land) pollution; (85%) saving on carbon dioxide emissions; saves energy; saves money / low cost; fly ash bricks can be made more quickly; less clay used;	**4**
2(b)(ii)	*any two from:* toxic metals may leak out; and poison humans; problem of disposal on demolition / eq;	**2**

Question	Answer	Marks
2(c)	*any six from:* *positives:* reduced air pollution; so better health; more jobs in renewable energy industries; named alternative, such as HEP / solar / wind / nuclear; do not contribute to carbon emissions; so less contribution to, climate change / global warming; acid rain; less damage from coal mining or coal waste; AVP; *negatives:* alternative energy can be expensive; credit example; unemployment; example of damage to the environment; old energy sites may be toxic; cannot be used for any other purpose; visual pollution of new energy sources; HEP loss of land; displace people / communities; AVP;	**6**