OCR
Oxford Cambridge and RSA

GCSE

Environmental and Land Based Science

Unit **B681/02:** Management of the Natural Environment (Higher Tier)

General Certificate of Secondary Education

Mark Scheme for June 2017

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

Abbreviations, annotations and conventions used in the detailed Mark Scheme.

/ = alternative and acceptable answers for the same marking point
(1) = separates marking points
not = answers which are not worthy of credit
reject = answers which are not worthy of credit
ignore = statements which are irrelevant
allow = answers that can be accepted
( ) = words which are not essential to gain credit
__ = underlined words must be present in answer to score a mark
ecf = error carried forward
AW = alternative wording
ora = or reverse argument

Annotations: the following annotations are available on SCORIS.

✓ = correct response
✖ = incorrect response
bod = benefit of the doubt
nbod = benefit of the doubt **not** given
ECF = error carried forward
^ = information omitted
I = ignore
R = reject

Highlighting is also available to highlight any particular points on the script.

The following questions should be annotated with ticks to show where marks have been awarded in the body of the text:

MARK SCHEME:

Expected Answers			Marks	Additional Guidance
1		B: Predicted profit is higher than other crops	1	
2		Two from: Growing legumes/stated leguminous crop; Adding (nitrogen rich) fertiliser; Increasing organic matter content (so more materials for decomposers to break down); Ploughing/ aerating soil to increase rate of nitrification/decay; Drainage to reduce rate of denitrification	2	**Allow named type of fertiliser** R: Crop rotation without mention of legumes
3	a	Two from: Cloning (owtte) of the fruit trees-genetic similarity; Management of soil would reduce weeds/ less food plants; Pesticides reduce the numbers of insects; Tree management reduces natural nesting habitats for birds;	1	**Allow other valid responses.** A: Pollution of water supply
3	b	(Use of pesticides) kills beneficial insects; Reduced range of habitats for animals; Machinery/ noise pollution; Risk of run off of fertilisers;	3	
4	a	(600 – 450 / 600) X 100 25(%)	2	2 marks for correct answer without showing working
4	b	See LOR markscheme	6	
4	c	Three from: Larger fields/ less hedges: less habitats for wild organisms Greater monocropping; erosion/ biodiversity Increase in mechanisation/ size of machines: impact on soil structure Fewer residents involved in farming/ more second homes;	3	A: migration to towns/cities

Expected Answers			Marks	Additional Guidance
		Fewer shops/ impact on local businesses; Greater unemployment/ less employment; Difficult to manage land if left fallow: impact on habitats;		
5	a	Canada Goose/ Greylag Goose	1	
	b	Number have increased by a large amount 1995-2013; The population numbers are large (the largest)	2	A: only a small decrease (1%) in 2013/14
	c	**Goosander duck**; 2 from: One of smallest populations (41); Population decrease in 2013-14 is significant (-20%); Population decrease 1995-2013 is the largest (-19%);	1 2	Allow reference to relative size/change if data not cited.
6		See LOR markscheme	6	
7		Individual clay particles clump together to form larger particles; The cations in Calcium (negatively charged), combine with the positively charged (anions) of the colloids (clay)	1 1	
8		D oxygen & water	1	
9	a	See LOR markscheme	6	
	b	Three from: Maintenance of drainage ditches; Dredging of rivers; Do not build homes on flood plains; Ensure sites for water ingress (rather than hard surfaces to cause run off); Development of sea/river defences on land to prevent water surges; Plant trees/ reduce deforestation	3	Accept other practical solutions.
10.	a	1. tonnes per hectare	1	Allow 10.28 and 10.29

Expected Answers			Marks	Additional Guidance
		1 mark for correct answer, 1 mark for an appropriate method shown	1	
	b	Mapping of specific gene; isolation of gene from donor organism; use of restriction enzyme; insertion into wheat cell; use of DNA ligase;	3	Allow descriptions that include the 'gene gun' technique or bacterial host (vector) for insertion.
	c	Advantages (one from): Uniformity in growth/ pest or disease resistance/ tolerant of hostile conditions (frost, salinity)/ higher yield/ less fertiliser input/ less land needed Disadvantages: lack of genetic diversity leaves crop vulnerable/ risk of genes getting into wild population/ long term effects not known/ cost of purchasing seed	2	
		Total	50	

Question	Answer	Marks	Guidance
4b	**[Level 3]** Demonstrates a knowledge of a wide range of facts and able to explain their impact with some detail Quality of written communication does not impede communication of the science at this level. (5-6 marks) **[Level 2]** An explanation of a narrow range of technological improvements. Information is accurate but brief. Quality of written communication partly impedes communication of the science at this level. (3-4 marks) **[Level 1]** A list of some of technological improvements that have been made. Quality of written communication impedes communication of the science at this level. (1-2 marks) **[Level 0]** Insufficient or irrelevant science of technical information. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to C** **Indicative topics likely to be included:** • Improved efficiency (generally) • Greater mechanisation (more work by less people in less time) • Improved growing blueprints (crops ready as set times) • Better varieties/ breeds (increased yield or more rapid growth) • Improved irrigation (improved yield) • Greater use of pesticides (less waste) • Improvements in fertilisers • GM • Less waste produce

Question	Answer	Marks	Guidance
6	**[Level 3]** An extensive description of a wide range of impacts on the ecosystem. Quality of written communication does not impede communication of the science at this level. (5-6 marks) **[Level 2]** A description of a limited range of impacts on the ecosystem. Quality of written communication partly impedes communication of the science at this level. (3-4 marks) **[Level 1]** A list of some of the objections with little expansion Quality of written communication impedes communication of the science at this level. (1-2 marks) **[Level 0]** Insufficient or irrelevant response. Answer not worthy of credit. (0 marks)	6	This question is targeted at grades up to A Indicative points may include: • Explanation of the impact on biodiversity/ habitats • Altering of the water table • Risk of pollution into water courses • Explosions may scare off animals • Loss of unspoilt habitats (eg woodland) • Additional roads (infrastructure) • Difficulty in restoring the area after the working has completed. • Dust/ air pollution • Disruption to migration paths • Impact on food webs

Question	Answer	Marks	Guidance
9a	**[Level 3]** A broad range of examples given, the response demonstrates a good understanding of the underlying issues. Quality of written communication does not impede communication of the science at this level. (5-6 marks) **[Level 2]** A range of ways of water efficiency given, providing some detail. Quality of written communication partly impedes communication of the science at this level. (3-4 marks) **[Level 1]** Simplistic responses, giving a limited range of examples. Quality of written communication impedes communication of the science at this level. (1-2 marks) **[Level 0]** Insufficient or irrelevant information. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to B** • Collection of run off from buildings and hard surfaces • Drainage pipes back to settlement tanks/reservoirs • Covering of water storage facilities to reduce evaporation • Time of day water is applied. • Avoid weather that would cause drift (wind) • Use more advanced irrigation systems • Specific examples such as Trickle drip • Computer controlled • Sensors to measure moisture content • Reference to using weather forecasts • Use of mulching • Timing of crops to reduce water demand • Use of crops requiring reduced watering • Understanding when crops would most benefit from water (i.e. after fruit set) • Monitor use so that savings can be made • Check regularly for leaks

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553