



**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 2014**

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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.

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1. These are the annotations, (including abbreviations), including those used in scoris, which are used when marking

Used in the detailed Mark Scheme:

Annotation	Meaning
/	alternative and acceptable answers for the same marking point
(1)	separates marking points
<b>not/reject</b>	answers which are not worthy of credit
<b>ignore</b>	statements which are irrelevant - applies to neutral answers
<b>allow/accept</b>	answers that can be accepted
(words)	words which are not essential to gain credit
words	underlined words must be present in answer to score a mark
ecf	error carried forward
AW/owtte	alternative wording
ORA	or reverse argument

Available in scoris to annotate scripts

	Blank Page – this annotation must be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
	indicate uncertainty or ambiguity
	benefit of doubt
	Contradiction
	incorrect response
	error carried forward
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response

<b>NBOD</b>	no benefit of doubt
<b>R</b>	Reject
	correct response
	draw attention to particular part of candidate's response
	information omitted

## 2. Subject-specific Marking Instructions

- If a candidate alters his/her response, examiners should accept the alteration.
- Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.

E.g.

For a one mark question, where ticks in boxes 3 and 4 are required for the mark:

Put ticks (✓) in the two correct boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

Put ticks (✓) in the two correct boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

Put ticks (✓) in the two correct boxes.

<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth 1 mark.

This would be worth 0 marks.

This would be worth 1 mark.

## c. The list principle:

If a list of responses greater than the number requested is given, work through the list from the beginning. Award one mark for each correct response, ignore any neutral response, and deduct one mark for any incorrect response, e.g. one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.

## d. Marking method for tick boxes:

Always check the additional guidance.

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.

If there is at least one tick, ignore crosses. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses.

Credit should be given for each box correctly ticked. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

E.g. If a question requires candidates to identify a city in England, then in the boxes

Edinburgh	
Manchester	
Paris	
Southampton	

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	✗	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	✗		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

## MARK SCHEME:

Question		Answer	Mark	Guidance
1		<b>B</b> Efficient- maximises land use	1	
2		<b>B</b> Run-off water may contain herbicides	1	
3		<ul style="list-style-type: none"> <li>• consider the task to be done</li> <li>• identify the potential hazards involved</li> <li>• consider the level of risk</li> <li>• identify methods to reduce the risk</li> <li>• record your findings</li> </ul>	1	
4		<p>2 from:</p> <p>Able to isolate specific genes; insertion into other organisms; quicker replication of organisms; less trial and error</p>	2	A: justification of why the process is quicker
5		Aggregation of clay particles into clumps	1	Allow descriptions relating to cations/ change in particle charge Allow descriptions relating to better drainage
6		Three from: Potential risk to livestock; competition for other top predators- may reduce their numbers; reduction in numbers of smaller mammals / fish due to additional predation; loss of nesting sites for other birds /animals	3	Allow increased numbers of tourists have impact on local environment
7		Retention of water; black colour heats up soil more quickly; absorbs more heat; reduction in erosion; less use of chemicals;	1	Reject: cheap or easy to use; protection from frost'; protection from pests or diseases
8	a	Soil compaction from vehicles; reduced airspaces; reduced drainage	1	
8	b	Remedial action: improve drainage by ploughing / sub soiling; mole drains; replanting / fertilising; keeping stock / vehicles off	2	Accept other forms of cultivation to remove compaction layer eg slitting

Question			Answer	Mark	Guidance
8	c		Reduced air spaces will decrease the numbers of soil organisms (such as worms) therefore less nutrient recycling; reduced microbial action may affect the availability of nutrients; Poor drainage may cause more run-off of soil/ nutrients; reduced humus content; poorer root penetration by plants; anaerobic conditions less decay/less root growth / less mineral uptake	2	
9	a		22%	1	Allow 21 & 23%
9	b		Age of farmers is increasing	1	
9	c		Farmers are living longer / young farmers can't afford to buy farms / young people see farming as too hard work / can't afford to retire / farming isn't profitable/ not interested.	1	A: increase in older people buying (smallholdings) A: younger people getting better paid jobs elsewhere
9	d		Increase in mean age of farm owners will mean an increase in mechanisation; Reduction in under 35s may be due to shortage of job opportunities so leave agriculture; Less farm turnover into new ownership may reduce adoption of new techniques; Aging farm owner population may mean requirement to hire more farm staff to do the jobs. Lack of succession Fewer small farms as large farms subsume them/take overs	2	ecf from (b) Wide range of possible answers but must be grounded in the use of data from the table showing shifts in relative farm owner age.
10			Loss due to respiration / lost as heat / thermal energy; not all parts consumed / forms detritus; movement; excretion / urine / egestion / faeces	2	

Question		Answer	Mark	Guidance
11		<p><b>[Level 3]</b>            Detailed scientific information and well developed explanation of the technique, likely to include issues regarding management of end products within the response and a discussion of the likely contribution to national energy needs.            Quality of written communication does not impede communication of the science at this level.            (5 – 6 marks)</p> <p><b>[Level 2]</b>            Explanation is developed and includes an understanding of the basic principles and inputs /outputs            Quality of written communication partly impedes communication of the science at this level.            (3 – 4 marks)</p> <p><b>[Level 1]</b>            Simple understanding of the concept of biogas production with limited detail within the answer            Quality of written communication impedes communication of the science at this level.            (1 – 2 marks)</p> <p><b>[Level 0]</b>            Insufficient or irrelevant science. Answer not worthy of credit.            (0 marks)</p>	6	<p><b>This question is targeted at grades up to A*</b></p> <p><b>Relevant points include:</b></p> <ul style="list-style-type: none"> <li>• Name of machine mentioned – Anaerobic digestor</li> <li>• Collection of suitable digestable / compostable materials such as plant / food / animal waste</li> <li>• Need for a power source to operate the equipment</li> <li>• Regulation of appropriate temperature</li> <li>• Production of methane</li> <li>• Issues relating to the storage of the gas. - gas tight container / size</li> <li>• Mechanism to manage / burn the gas / transfer to other machine</li> <li>• Many farms produce plant and animal waste which need to be disposed of</li> <li>• There are many farms in the UK producing this waste</li> <li>• This could make a significant contribution to UK energy resources</li> <li>• Unaffected by climatic conditions: predictable, reliable source of energy</li> <li>• Waste following treatment is a valuable product saving more energy</li> </ul> <p>Reduces reliance on fossil fuels saving them for other uses</p>

Question		Answer	Mark	Guidance
12		<p><b>[Level 3]</b> A thorough description of an accepted crop rotation system with an understanding of applying the order correctly in future seasons. Understanding of the reasons for this technique are detailed. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p><b>[Level 2]</b> Work contains both details of an accepted crop rotation system and also a demonstration of an understanding of some of the reasons for this management technique. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p><b>[Level 1]</b> A simple list of reasons for crop rotation with little expansion or a description of basic crop rotation techniques. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p><b>[Level 0]</b> Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p><b>This question is targeted at grades up to C</b></p> <p><b>Relevant points include:</b></p> <ul style="list-style-type: none"> <li>• Description of a widely accepted crop rotation system, most commonly either a 3, 4 or 5 year rotation.</li> <li>• Definition of crops into different crop groups For example (brassicas, roots, others) or (Brassicas, roots, legumes). (if 5 year rotation: brassicas, legumes, potatoes, onions, roots)</li> <li>• Concept of fallow land if there is space.</li> <li>• Concept of retaining space for perennial crops.</li> <li>• Progression of crops into the correct beds the following year i.e. brassicas to follow legumes.</li> </ul> <p><b>Reasons for crop rotation:</b></p> <ul style="list-style-type: none"> <li>• Maximisation of nutrition</li> <li>• Maximisation of pH changes</li> <li>• Reduction in pests</li> <li>• Reduction in diseases</li> <li>• Maximisation of soil cultivation activities</li> </ul>

Question		Answer	Mark	Guidance
13		1 mark for naming organisation 2 examples of projects/activities or campaigning carried out by a named organisation	1 2	One mark for naming organisation No marks if an organisation is not named
14	a	Any two from: Loss of habitats/food sources for the population overall; Climate change; pollution; Conservation site has been actively managed to maintain suitable habitats	2	
14	b	i 33%	1	Accept 33.3/33.33
14	b	ii Species is vulnerable if this site is lost; OWTTE	1	
14	c	Conservation sites are maintaining their population so invest in these / or buy/ develop more	1	
14	d	Any <b>two</b> from: Method not random; Method not systematic; Errors in butterfly identification; Areas surveyed not representative;	2	Accept: Sample size is insufficient; might count them more than once; timing /weather difference  Reject: didn't count them all.

Question		Answer	Mark	Guidance
15		<p><b>[Level 3]</b> Addresses the full range of environmental concerns and gives detailed explanations of how these might be reduced. Suggestions are realistic and implementable. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p><b>[Level 2]</b> Answers show some detail with examples and modifications to reduce environmental impact. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p><b>[Level 1]</b> Simplistic answers given with little detail or justification. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p><b>[Level 0]</b> Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p><b>This question is targeted at grades up to A*</b></p> <p><b>Relevant points include:</b></p> <ul style="list-style-type: none"> <li>• Planting of trees to screen site reduce noise</li> <li>• Use of banks to screen site reduce noise</li> <li>• Low rise buildings suitably coloured to minimise visual impact</li> <li>• Access roads to be routed to protect SSSI and reduce visual impact</li> <li>• Road designed to reduce polluting run off.</li> <li>• Tunnels for wildlife to cross roads safely</li> <li>• Management plan to deal with large amounts of waste produced to minimise pollution</li> <li>• Timing restrictions for vehicles</li> </ul> <p>Systems to reduce impact of smell</p>

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