

# **Environmental and Land-Based Science**

General Certificate of Secondary Education

Unit **B493/02**: Management of the Natural Environment (Higher Tier)

## **Mark Scheme for January 2013**

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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.

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










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## Annotations

Used in the detailed Mark Scheme:

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

Available in scoris to annotate scripts:

	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
	no benefit of doubt

	reject
	correct response
	draw attention to particular part of candidate's response
	information omitted

### Subject-specific Marking Instructions

- a. Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).
- b. 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 the third and fourth boxes are required for the mark:*

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

*This would be worth  
1 mark.*

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

*This would be worth  
0 marks.*

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

*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-box questions:

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 and other markings. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses. Credit should be given according to the instructions given in the guidance column for the question. 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 cities in England:

Edinburgh	<input type="checkbox"/>
Manchester	<input type="checkbox"/>
Paris	<input type="checkbox"/>
Southampton	<input type="checkbox"/>

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	✓	x	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
<b>Score:</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NR</b>

- e. For answers marked by levels of response:
- i. **Read through the whole answer from start to finish**
  - ii. **Decide the level** that **best fits** the answer – match the quality of the answer to the closest level descriptor
  - iii. **To determine the mark within the level**, consider the following:

Descriptor	Award mark
A good match to the level descriptor	The higher mark in the level
Just matches the level descriptor	The lower mark in the level

- iv. Use the **L1**, **L2**, **L3** annotations in Scoris to show your decision; do not use ticks.

Quality of Written Communication skills assessed in 6-mark extended writing questions include:

- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

Question		CBT Q No	Answer	Marks	Guidance									
1			C natural ecosystems are left undisturbed	1										
2			GM crops might breed with wild species	1										
3			spraying	1										
4			<table border="1"> <thead> <tr> <th></th> <th>sandy soil</th> <th>clay soil</th> </tr> </thead> <tbody> <tr> <td>drainage</td> <td>good</td> <td>poor</td> </tr> <tr> <td>water holding</td> <td>poor</td> <td>good</td> </tr> </tbody> </table>		sandy soil	clay soil	drainage	good	poor	water holding	poor	good	2	each line correct one mark
	sandy soil	clay soil												
drainage	good	poor												
water holding	poor	good												
5			top RHS	1										
6			conservation	1										
7			heather and pine	1	both needed for the mark									
8			tick all except: make protection laws	1	all correct for one mark									
9			bottom LHS	1										
10			turn heaters off when optimum temperature is reached / turn lights on and off to maintain optimum growth / open and close vents to maintain optimum temperature	1										

Question		CBT Q No	Answer	Marks	Guidance
11			definition: same crop grown each year; no variety;  effects: removal of same / specific nutrients; build up of pests / diseases; need for use of more fertiliser / pesticide	3	
12			for: The food is grown using organic methods / it helps to provide organic food for everyone;  against: Moving food over long distances creates a big carbon footprint	2	
13			reduced drainage / reduced air spaces / reduced humus content	2	
14			<i>any two from:</i> inefficiency of energy transfer; respiration; substances in urine; not all of organism is eaten	2	
15			<i>Nitrogen fixing:</i> fix atmospheric nitrogen / nitrogen gas / N <sub>2</sub> into ammonia/ammonium compounds and <i>Nitrifying:</i> ammonium compounds into more complex compounds / nitrate nitrates	2	<b>allow</b> nitrates in fixation
16			11 miles	1	
17			<b>C</b> 53.3% [80 divided by 150 multiplied by 100]	1	<b>accept</b> 54 to 56



Question		CBT Q No	Answer	Marks	Guidance
18	(a)		% loss in peas is bigger than in sugar beet; % loss in peas is similar for both types of compacted soil while sugar beet has more loss in compacted heavy soils; % loss in peas is greatest in light soils while in sugar beet it is greatest in heavy soils	2	one mark for each correct comment (max 2). Accept converse comments.
	(b)		soil compaction reduces root growth	1	
19			35 000	1	evidence of calculation not required for mark
20			ever increasing demand as world population grows / technology advances / mechanisation increases depletion of traditional resources; coal; oil; gas public / government demand for less polluting energy generation / cheap energy	3	
21			nitrates stimulate growth of (aquatic) plants plants block out sunlight – causing death of smaller plants plants decay – decay organisms (bacteria) remove oxygen	3	
22			pigs will eat organisms other than acorns (as seasonal) competing with other organisms for these food sources; pigs may damage environment eg wallowing in water sources / digging for roots; pollution from excrement; Introduction of new pests (worms) and diseases	2	
<b>Total</b>				<b>36</b>	

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