

**GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**ENVIRONMENTAL AND LAND-BASED SCIENCE**

**B681/01**

Unit B681: Management of the Natural Environment (Foundation Tier)

Candidates answer on the question paper  
 A calculator may be used for this paper

**OCR Supplied Materials:**  
 None

**Duration:** 1 hour

**Other Materials Required:**

- Calculator

Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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**INSTRUCTIONS TO CANDIDATES**

- Write your name, clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

**INFORMATION FOR CANDIDATES**

- Your quality of written communication is assessed in questions marked with a pencil (✎).
- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **50**.
- This document consists of **20** pages. Any blank pages are indicated.

For Examiner's Use		
	Max	Mark
1	1	
2	2	
3	1	
4	2	
5	2	
6	3	
7	2	
8	3	
9	3	
10	3	
11	2	
12	6	
13	2	
14	6	
15	6	
16	6	
<b>TOTAL</b>	<b>50</b>	

Answer **all** the questions.

1 Clover is a legume.

Legumes are used in crop rotation.

Which is the **best** reason for using legumes in crop rotation?

- A They decrease the humus content of the soil.
- B They decrease the number of pests in the soil.
- C They increase the availability of nitrogen in the soil.
- D They kill weeds growing in the soil.

Answer **A, B, C** or **D**.....[1]

2 Describe the role of one conservation body you have studied.

name of conservation body

.....

role

.....

.....

..... [2]

3 The pH of soil can be determined by carrying out a simple test.

A sample of soil is placed in a test tube.

What must be added to the soil sample before adding indicator?

Choose **one** answer from **list one** and one answer from **list two**.

**list one**

tap water

salt water

de-ionised (distilled) water

bottled water

**list two**

barium chloride

barium sulfate

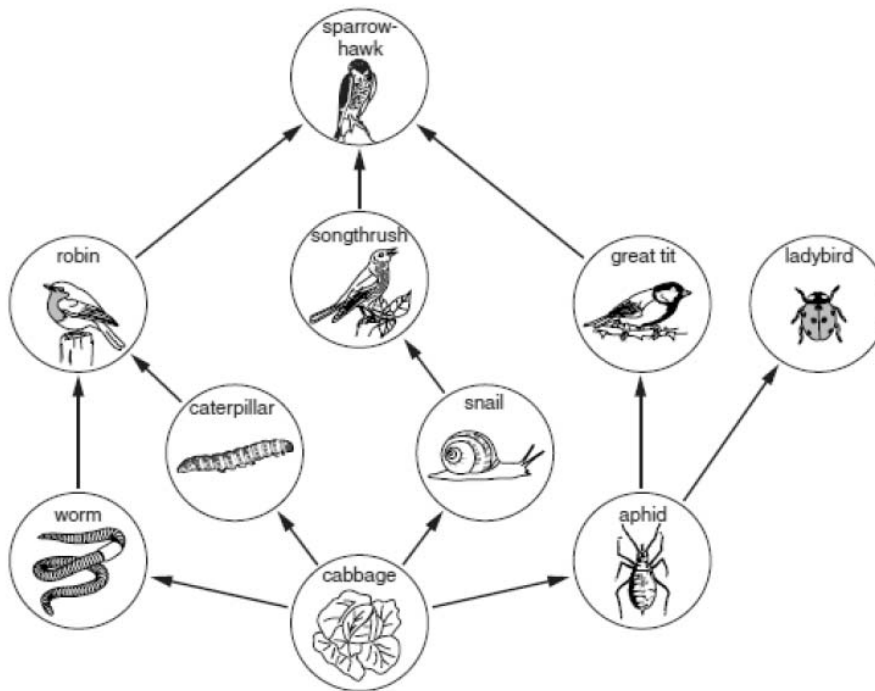
calcium carbonate

calcium sulfate

..... [1]

4 An allotment holder is growing cabbages.

The diagram shows a food web.



Which of the changes below is likely to lead to an increase in the yield of cabbages?

Put a tick (✓) in the box next to any correct answers.

- increase in snail numbers
- increase in robin numbers
- decrease in ladybird numbers
- decrease in aphid numbers

Give reasons for your choices.

.....

..... [2]

5 Students are going to carry out an investigation into weedkillers.

They use the school playing field.



© iStockphoto.com / Stephen Bonk

Using weedkillers raises safety concerns.

Explain why a risk assessment needs to be carried out before using weedkillers.

.....

.....

.....

..... [2]

6 Many organisms live in the soil.

Explain the importance of soil organisms in making nutrients available to plants.

.....

.....

.....

..... [3]

7 The diagram shows an advert for organic vegetables.



The grower has to use organic methods when growing these vegetables.

Give **two** examples of **organic methods**.

1 .....

.....

.....

2 .....

.....

.....

[2]

8 The use of GM crops around the world causes many arguments.

Some people say that GM crops will help prevent famine and help save the environment.

Others say that they will not and may cause disease in humans and animals and contribute to environmental damage.

(a) GM crops have been genetically modified. Explain what is meant by genetic modification.

.....  
..... [1]

(b) Suggest **two** ways the use of GM crops might affect the environment.

.....  
.....  
..... [2]



9 Land-based industries need supplies of water.

Describe the similarities and differences between the ways water is used on livestock and arable farms.

.....

.....

.....

.....

.....

..... [3]

10 Owners of a commercial glasshouse keep records of the growing conditions.



Give **three** reasons why this is important.

.....

.....

.....

.....

..... [3]

11 The photographs show an artificial ecosystem (a garden) and a natural ecosystem (a woodland).



Describe the differences in biodiversity in the woodland and the garden.

.....

.....

.....

.....

..... [2]

12 Look at the table.

It shows how yield is affected when herbicide is not used, for a range of crops.

crop	percentage (%) of yield lost when herbicide is not used
apples	15
carrots	48
green beans	20
potatoes	32
wheat	25

- (a) When growing carrots using herbicide, a farmer has an annual yield of 17 metric tons per hectare. He has three hectares.

What would his total annual yield be if he did not use herbicides?

.....

.....

answer .....metric tons [2]

- (b) Explain how and why yield is affected by the use of herbicides for this range of crops.

.....

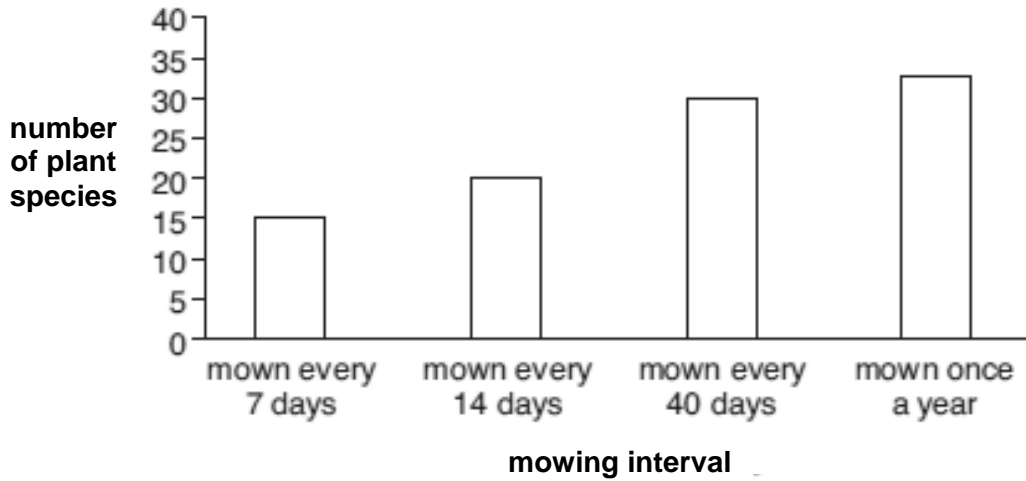
.....

.....

..... [4]

13 Roundabouts covered in grass were mown at different intervals of time.

The bar chart compares the numbers of plant species found on roundabouts with different mowing intervals.



What advice would you give to councils who wanted to increase the biodiversity on their roundabouts?

Use the data in the chart to explain why you would give this advice.

.....

.....

.....

..... [2]









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**ENVIRONMENTAL AND LAND-BASED SCIENCE**

**B681/01**

Unit B681: Management of the Natural Environment (Foundation Tier)

**MARK SCHEME**

**Duration:** 1 hour

**MAXIMUM MARK      50**

## Guidance for Examiners

Additional guidance within any mark scheme takes precedence over the following guidance.

1. Mark strictly to the mark scheme.
2. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.
3. Accept any clear, unambiguous response which is correct, eg mis-spellings if phonetically correct (but check additional guidance).
4. Abbreviations, annotations and conventions used in the detailed mark scheme:

/ = 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  
words = underlined words must be present in answer to score a mark  
 ecf = error carried forward  
 AW/owtte = alternative wording  
 ORA = or reverse argument

Eg mark scheme shows 'work done in lifting/(change in) gravitational potential energy' (1)  
 work done = 0 marks  
 work done lifting = 1 mark  
 change in potential energy = 0 marks  
 gravitational potential energy = 1 mark

5. If a candidate alters his/her response, examiners should accept the alteration.
6. 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.

Eg

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"/>

This would be  
worth 0 marks.

Put ticks (✓) in  
the two correct  
boxes.

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

This would be  
worth one mark.

Put ticks (✓) in  
the two correct  
boxes.

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

This would be  
worth one mark.

## 7. 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, eg 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.

## 8. 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, eg 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.

eg 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	✓	x	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR


Question		Expected answer	Marks	Additional guidance
1		C - availability of nitrogen	[1]	
2		idea of protection of animals, plants idea of protection of habitats	[2]	no marks for name of conservation body role must match name of body for marks to be awarded. Roles identified must be for conservation
3		de-ionised (distilled) / distilled water AND barium chloride	[1]	both required for 1 mark
4		2 <sup>nd</sup> box ticked: because robin will eat worms and caterpillars reducing their numbers, so there are fewer to eat the cabbage 4 <sup>th</sup> box ticked: if there are fewer aphids there are fewer to eat the cabbage	[2]	1 mark for both tick and reason linked to choice  <b>ignore</b> reasoning why 1 <sup>st</sup> and 3 <sup>rd</sup> box not ticked
5		to ensure that the risks are understood so that idea of appropriate measures taken to reduce risks	[2]	<b>accept</b> idea of analysing consequences/seriousness of risks, or their likelihood of occurring <b>reject</b> examples of measures answers must be linked in order to gain full credit; they must link analysis of the risk to the measures taken and should be in the order specified
6		three from: dead plants / animal waste unavailable to plants so detritivores increase surface area for decay by decomposers which ingest / break down organic materials into soluble nutrients soluble nutrients within soil water can be absorbed by plants	[3]	answers must be linked in order to gain full credit; they must link action of organisms to increasing solubility of nutrients and should be in the order specified




Question		Expected answer	Marks	Additional guidance
7		use natural fertilisers / do not use artificial fertilisers use natural pesticides / do not use artificial pesticides	[2]	<b>accept</b> examples, eg manure <b>accept</b> examples only organic methods connected with the production of vegetables accepted
8	(a)	the DNA of the crop has been altered by introducing new genes from another organism	[1]	
	(b)	two from: cross contaminate / pollinate with wild species create monocultures by out competing with other plants encourage less use of pesticides so less pollution	[2]	pollution needs qualifying for mark to be awarded
9		three from: similarity: cleaning machinery and yards (on both types of farm)  differences: provision of drinking water to livestock only irrigation of crops in arable only cooling of milk for livestock farming only	[3]	<b>allow</b> irrigation as similarity if clearly linked to provision of animal feed on livestock farm

Question		Expected answer	Marks	Additional guidance
10		three from: closer management of future resources act as a blueprint for future production calculation of costs of production prediction of pest or disease attacks	[3]	
11		greater diversity in woodland so greater variety of organisms / range of species present	[2]	<b>allow</b> reverse argument
12	(a)	$(17 \times 0.52) = 8.84$  $(8.8 \times 3) = 26.5$ (metric tons)	[2]	<b>accept</b> any valid calculation  2 marks for correct answer
	(b)	yield decreases when herbicides are not used / ora because competition with weeds is limiting the growth of crop this is due to competition for nutrients / water / light; although the effect on yield is different for different crops	[4]	answers must be linked in order to gain full credit; they must link the decrease in the yield with ideas about competition but need not be in the order specified
13		mow only once a year because the plant diversity is highest / about 30 species	[2]	answers must be linked in order to gain full credit; they must link the mowing frequency with plant diversity but need not be in the order specified




Question	Expected answer	Marks	Additional guidance
14 	<p><b>[level 3]</b> Comprehensive discussion with a balanced representation of positive and negative impacts, shows understanding of increased yield balanced against environmental cost. All information in answer is relevant, clear, organised and presented in a structured and coherent format. Specialist terms are used appropriately. Few, if any, errors in grammar, punctuation and spelling. (5 – 6 marks)</p> <p><b>[level 2]</b> Discussion considers some positive and negative impacts. For the most part the information is relevant and presented in a structured and coherent format. Specialist terms are used for the most part appropriately. There are occasional errors in grammar, punctuation and spelling. (3 – 4 marks)</p> <p><b>[level 1]</b> Discussion considers either positive or negative impacts or does not explain points covered. Some points made with little or no structure with few examples given. Answer may be simplistic. There may be limited use of specialist terms. Errors of grammar, punctuation and spelling prevent communication of the information. (1 – 2 marks)</p> <p><b>[level 0]</b> Insufficient or irrelevant information. Answer not worthy of credit. (0 marks)</p>	[6]	<p><b>relevant points include:</b></p> <p><b>positive impacts</b></p> <ul style="list-style-type: none"> <li>• decrease costs</li> <li>• increased speed / can cover more area in the same time</li> <li>• able to cultivate marginal land</li> <li>• resulting in increased yield</li> </ul> <p><b>negative impacts</b></p> <ul style="list-style-type: none"> <li>• impact of compaction on soil habitats / drainage / air content</li> <li>• consequences of erosion due to cultivation of marginal land / steep slopes</li> <li>• cultivation of peat moors damaging a valuable ecosystem</li> <li>• CO<sub>2</sub> released into atmosphere contributing to global warming</li> <li>• consumption of fossil fuels which are a limited resource</li> <li>• air pollution, eg in relation to hydrocarbons / CO / CO<sub>2</sub></li> <li>• loss of hedgerows due to need for larger fields resulting in loss of habitats</li> </ul> <p><b>allow</b> idea of start up costs required to purchase machinery</p>

Question	Expected answer	Marks	Additional guidance
15 	<p><b>[level 3]</b> Thorough answer applying knowledge of weathering, deposition and importance of plants and animals to explain the formation of the landscape. All information in answer is relevant, clear, organised and presented in a structured and coherent format. Specialist terms are used appropriately. Few, if any, errors in grammar, punctuation and spelling. (5 – 6 marks)</p> <p><b>[level 2]</b> Partial answer applying limited knowledge of weathering, deposition and importance of plants and animals to explain the formation of the landscape. For the most part the information is relevant and presented in a structured and coherent format. Specialist terms are used for the most part appropriately. There are occasional errors in grammar, punctuation and spelling. (3 – 4 marks)</p> <p><b>[level 1]</b> Identifies the roles of weathering, deposition and living organisms in the formation of the landscape. Answer may be simplistic. There may be limited use of specialist terms. Errors of grammar, punctuation and spelling prevent communication of the information. (1 – 2 marks)</p> <p><b>[level 0]</b> Insufficient or irrelevant information. Answer not worthy of credit. (0 marks)</p>	<b>[6]</b>	<b>relevant points include:</b> <ul style="list-style-type: none"> <li>• limestone is a soft rock / dissolves in water / rainfall</li> <li>• chemical and physical weathering on the sides of the valley due to water / ice / wind</li> <li>• river flows creates a channel / v-shaped valley</li> <li>• deposition / particles deposited from river in base of valley / where water moves more slowly</li> <li>• creates soil when mixed with organic matter / humus</li> <li>• plants and animals die and decay, adding organic matter making soil productive / fertile</li> <li>• trees and other vegetation on valley sides help to stabilise the ground / prevent further erosion</li> </ul>

Question	Expected answer	Marks	Additional guidance
16 	<p><b>[level 3]</b> Comprehensive explanation with all aspects of alternative energy production covered with examples clearly linked to uses of energy on the farm in the photograph. All information in answer is relevant, clear, organised and presented in a structured and coherent format. Specialist terms are used appropriately. Few, if any, errors in grammar, punctuation and spelling. (5 – 6 marks)</p> <p><b>[level 2]</b> Explanation given with some aspects covered and some examples linked to uses of energy on the farm. For the most part the information is relevant and presented in a structured and coherent format. Specialist terms are used for the most part appropriately. There are occasional errors in grammar, punctuation and spelling. (3 – 4 marks)</p> <p><b>[level 1]</b> Some aspects of alternative energy production covered with few, if any, examples given or linked to uses in the farm. Answer may be simplistic. There may be limited use of specialist terms. Errors of grammar, punctuation and spelling prevent communication of the information. (1 – 2 marks)</p> <p><b>[level 0]</b> Insufficient or irrelevant information. Answer not worthy of credit. (0 marks)</p>	[6]	<p><b>relevant points include:</b></p> <ul style="list-style-type: none"> <li>• manure from the animals used to generate biogas, then burned to produce heat (for the farmhouse or animal houses) or to generate electricity</li> <li>• wind turbine powering a dynamo to produce electricity, or a pump for water supplies for the animals (poultry house / pig house / cattle shed)</li> <li>• solar panels / photovoltaic cells producing electricity or alternatively a description of hot water ('collector') system for the farmhouse or animal houses</li> <li>• crops burned directly to produce heat for the farm house or animal houses (straw for example)</li> </ul>
	<b>Total</b>	<b>[50]</b>	

### Assessment Objectives (AO) Grid

(includes quality of written communication )

Question	AO1	AO2	AO3	Total
1	1			1
2	2			2
3	1			1
4		2		2
5	2			2
6	3			3
7		2		2
8(a)	1			1
8(b)	2			2
9		3		3
10	3			3
11		2		2
12a		2		2
12b	4			4
13			2	2
14 	6			6
15 		6		6
16 		6		6
<b>Totals</b>	<b>25</b>	<b>23</b>	<b>2</b>	<b>50</b>

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