AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

AS
ENVIRONMENTAL STUDIES

Unit 1 The Living Environment

Wednesday 18 May 2016 Afternoon Time allowed: 1 hour

Materials
You will need no other materials.
You may use a calculator.

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- Two of these marks are for the Quality of Written Communication.
- You will be marked on your ability to:
  –use good English
  –organise information clearly
  –use specialist vocabulary where appropriate.
- Question 6(b) should be answered in continuous prose.
  Quality of Written Communication will be assessed in this answer.

Answer **all** questions in the spaces provided.

1 **Table 1** shows methods used to manage land-use conflicts.

Complete **Table 1**.

[5 marks]

Table 1

Name of method	How land-use conflict is managed
Space Zoning	Allocates different areas to different land uses
	Assesses the economics of a development by assigning a monetary value to all aspects of the development
Green Belt designation	
	A government inspector collects evidence to recommend whether planning permission should be granted
Leopold Matrix	
	Allocates different times to different land uses in the same area

5

2 It is estimated that the output of radiation from the Sun has increased by 30% since life first developed on Earth, 3.5 billion years ago. Despite this, the temperatures on Earth have not shown such a large increase.

Table 2 shows the estimated nitrogen, oxygen and carbon dioxide content of the atmosphere 3.5 billion years ago and their present day atmospheric composition.

Table 2

Gas	Atmospheric content / percentage volume	
	3.5 billion years ago	**Present day**
Nitrogen	62	78
Oxygen	Trace	21
Carbon dioxide	18	0.04

2 (a) (i) Use information from **Table 2** to suggest why, despite the 30% increase in solar radiation, temperatures on Earth have not shown such a large increase.

[2 marks]

2 (a) (ii) Early life lived in the oceans. Organisms first colonised land around 0.5 billion years ago.

Explain why the change in oxygen concentration shown in **Table 2** made the survival of life on land possible.

[2 marks]

Question 2 continues on the next page

2 (b) Give **two** properties of water that create suitable conditions for life on Earth.

[2 marks]

1 _____

2 _____

2 (c) **Table 3** gives some details of four biomes.

Table 3

Biome	Estimated number of species			
	Birds	**Amphibians**	**Reptiles**	**Mammals**
Tropical rainforest	13100	4900	5500	4700
Tropical grassland	3750	750	2000	1500
Temperate deciduous woodland	2000	500	400	1000
Tundra	800	1	1	300

2 (c) (i) Define the term **biome**.

[1 mark]

_____

_____

2 (c) (ii) Suggest why Tundra has the lowest ecological stability.

[2 marks]

_____

_____

_____

_____

2 (d) Feeding, insect pollination and seed dispersal by animals are forms of interspecies relationships, examples of which are shown in **Figure 1**.

Figure 1

Feeding

Pollination

Seed dispersal

Give **one other** interspecies relationship.

[1 mark]

_____

_____

10

Turn over for the next question

3 The Harlequin Ladybird, *Harmonia axyridis,* is not indigenous to the UK. It was introduced to Europe for use in agricultural pest control.

Indigenous ladybird populations, such as the 7-spot Ladybird, have declined since the introduction of the Harlequin Ladybird.

Figure 2 shows the Harlequin Ladybird and the 7-spot Ladybird.

Figure 2

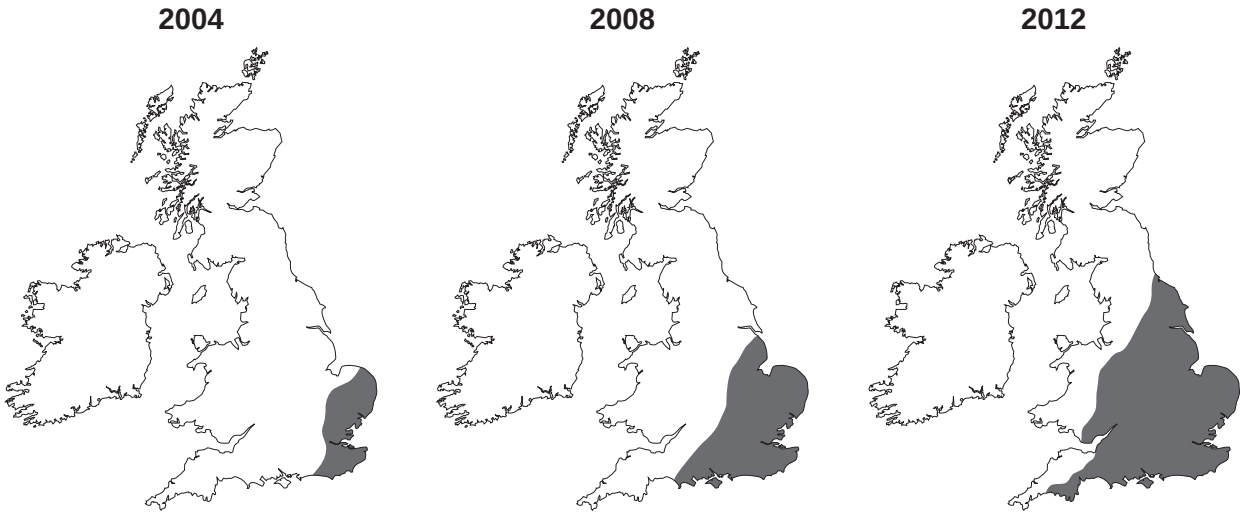
The Harlequin Ladybird

The 7- spot Ladybird

0 **5 mm**

Figure 3 shows how the distribution of the Harlequin Ladybird changed in the UK between 2004 and 2012.

Figure 3



3 (a) Suggest **three** ways in which the introduction of the Harlequin Ladybird may have caused the decline of the 7-spot Ladybird.

[3 marks]

1 _____

_____

2 _____

_____

3 _____

_____

3 (b) Suggest **two** reasons why the conservation of the 7-spot Ladybird may be economically important to humans.

[2 marks]

1 _____

_____

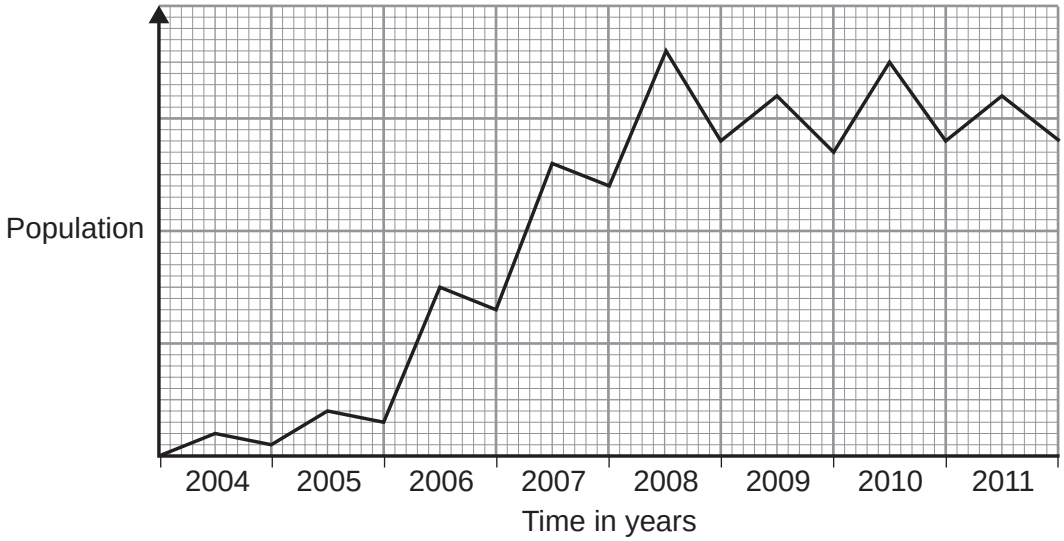
2 _____

_____

Question 3 continues on the next page

3 (c) **Figure 4** shows how the population of a ladybird species changed in a small study area between 2004 and 2012.

Figure 4



3 (c) (i) Use information from **Figure 4** to identify the year when the population first reached carrying capacity.

[1 mark]

Tick (✓) **one** box.

2004	2006	2008	2010	2011
☐	☐	☐	☐	☐

3 (c) (ii) Outline how a **named factor** may maintain a ladybird population around its carrying capacity.

[4 marks]

Factor: _____

_____

_____

_____

_____

_____

_____

_____

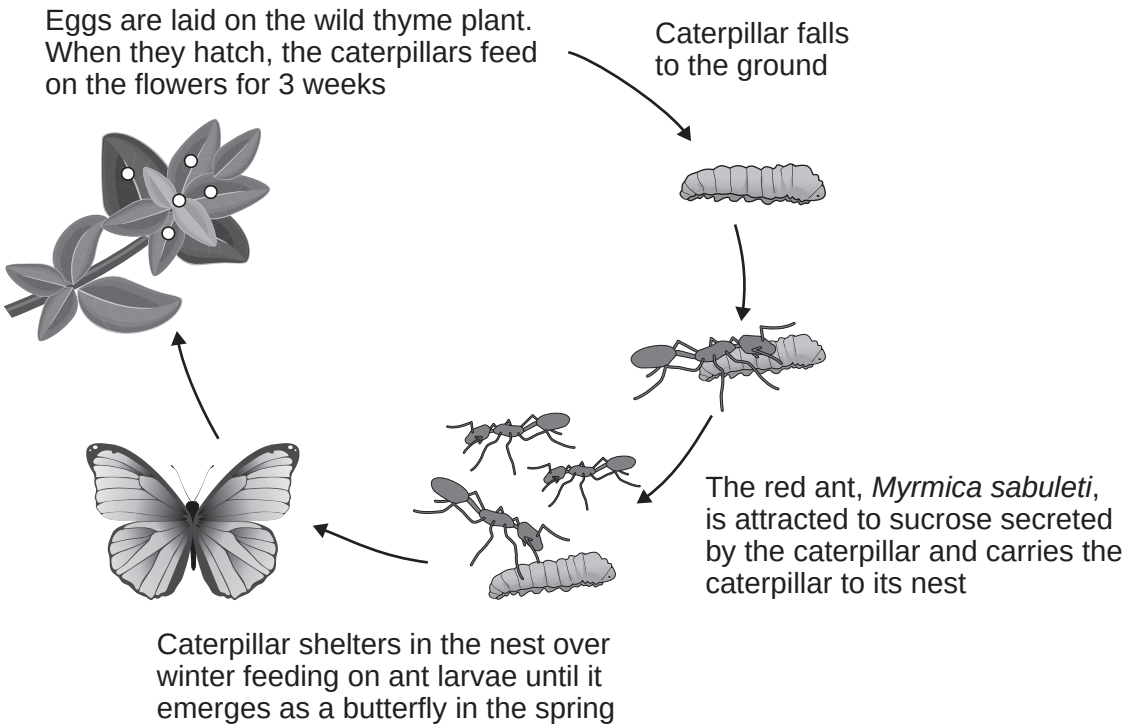
_____

10

Turn over for the next question

4 The Large Blue Butterfly, *Maculinea arion,* is dependent on one species of red ant, *Myrmica sabuleti,* and wild thyme plants. The lifecycle is shown in **Figure 5**.

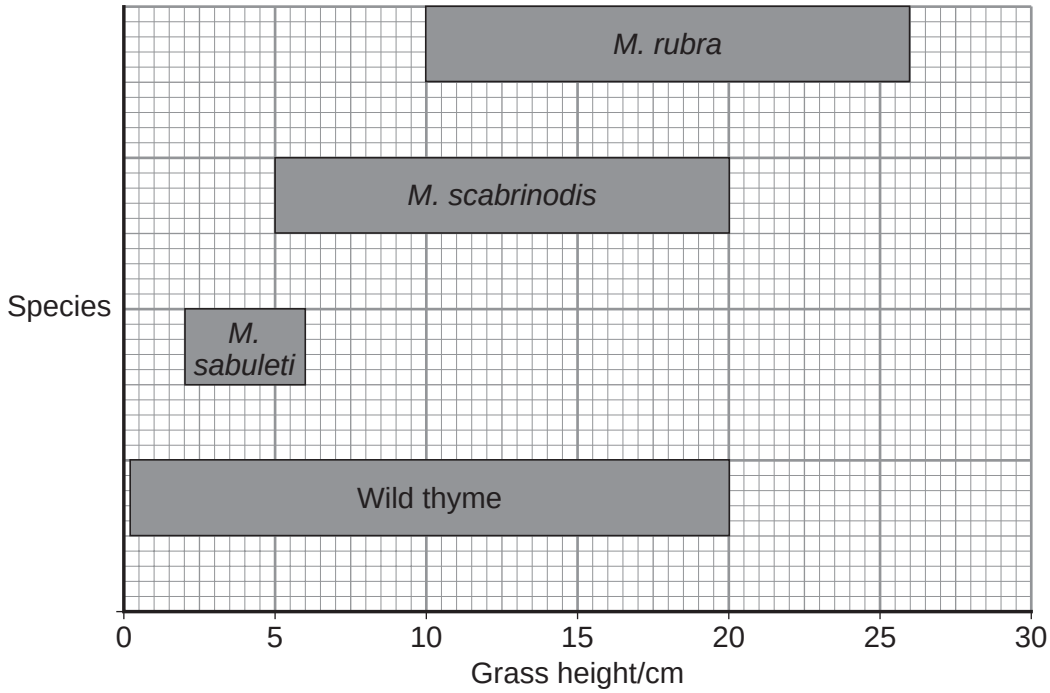
Figure 5



- Two other species of red ant, *Myrmica rubra* and *M. scabrinodis,* share similar ecological niches with *M. sabuleti*.
- All three ant species live in grassland habitats.
- Each ant species is attracted to the sucrose secreted by the caterpillars and will carry the caterpillars to their nests.
- *M. rubra* and *M. scabrinodis* are predators of the caterpillars.
- *M. sabuleti* is not a predator of the caterpillars.

Figure 6 shows the ranges of grass height that provide a suitable habitat for the wild thyme plants and the three species of red ant.

Figure 6



4 (a) (i) Use information from **Figure 5** and **Figure 6** to suggest why the Large Blue Butterfly population would be affected if the grassland were maintained at the following heights.

[3 marks]

3 cm _____

_____

7 cm _____

_____

25 cm _____

_____

4 (a) (ii) Suggest why all three ant species are not found at the same grass heights.

[2 marks]

_____

_____

_____

Turn over ▶

4 (b) The Large Blue Butterfly was declared extinct in the UK in 1979. It has since been successfully re-introduced as part of a long-term conservation programme.

Conservation of this butterfly involves managing the height of the grass by sheep grazing. This maintains the habitat as a plagioclimax.

Give the meaning of the term **plagioclimax**.

[1 mark]

_____

_____

_____

4 (c) **Figure 7** shows wild thyme plants.

Figure 7

Scale 0 10 mm

Large Blue Butterfly populations will only survive if a minimum of 5% of the grassland is covered by wild thyme plants.

4 (c) (i) Calculate the minimum area of grassland that would need to be covered with wild thyme in a field measuring 120 m × 97 m.

[1 mark]

_____ m^2

4 (c) (ii) Suggest how the percentage cover of wild thyme plants within a grassland habitat could be estimated.

[4 marks]

4 (d) Describe the changes in abiotic factors that would occur if grazing were stopped.

[4 marks]

15

Turn over for the next question

5 The area of natural and semi-natural habitats within the UK, such as lowland heath and chalk grassland, is significantly lower than 150 years ago.

5 (a) (i) Suggest **one** reason why the area of such habitats in the UK has declined.

[1 mark]

_____

_____

5 (a) (ii) Name **one** habitat management technique, other than grazing, that is used to maintain a plagioclimax habitat in the UK.

[1 mark]

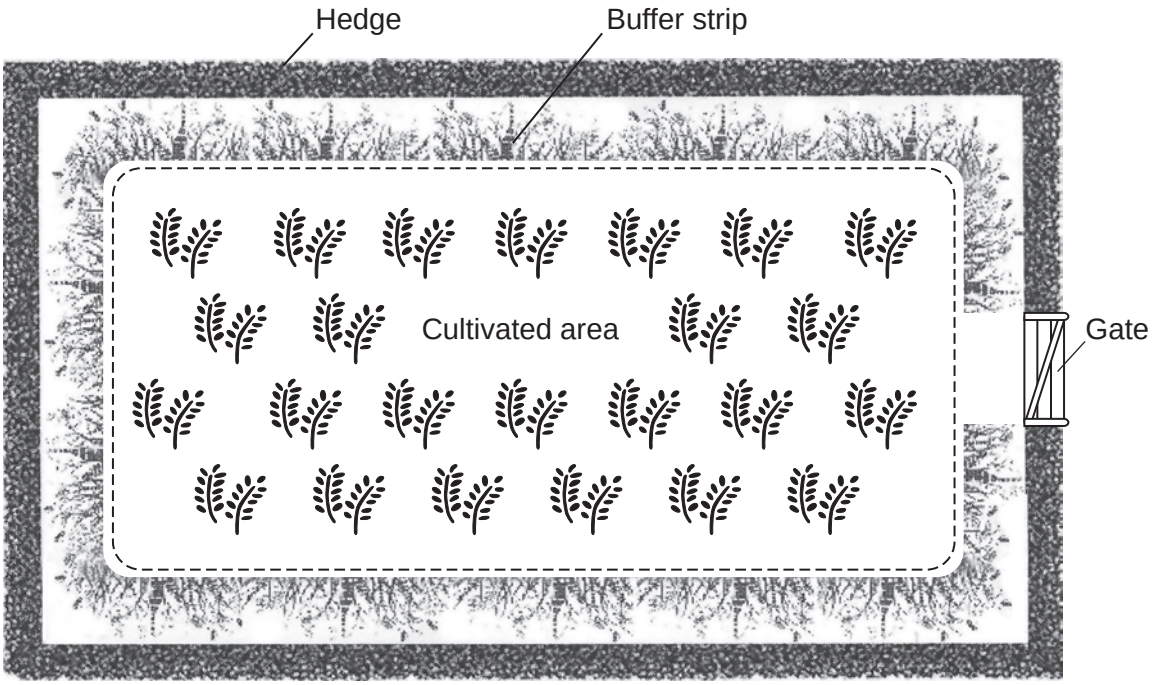
_____

_____

Farmers in the UK may take part in a scheme where they receive payments for managing their agricultural land in ways that benefit wildlife.

Figure 8 shows one of these management methods. An area, four metres wide, known as a buffer strip, is left uncultivated around the perimeter of the field.

Figure 8



5 (b) Give **one** reason why hedgerows are an important habitat for wildlife.

[1 mark]

_____

_____

5 (c) The effect of buffer strips on species diversity was investigated.

It was predicted that the diversity of soil invertebrates would increase across the buffer strip from the edge of the cultivated area to the hedge.

5 (c) (i) Describe **one** practical method that may have been used to test this hypothesis.

[5 marks]

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

5 (c) (ii) Suggest **two** reasons why the species diversity of soil invertebrates within the buffer strip may be highest nearest the hedge.

[2 marks]

_____

_____

_____

10

6 The Cairngorms National Park is located in the Scottish Highlands.

In the winter months, the Cairngorms are a popular ski destination with a number of ski centres that offer a wide range of services and facilities.

Figure 9

6 (a) Outline **one** way in which tourist facilities, such as ski centres:

6 (a) (i) meet the aims of a National Park

[1 mark]

6 (a) (ii) conflict with the aims of a National Park.

[1 mark]

6 (b) Describe the methods that are used to conserve threatened species within the UK.

You should answer this question in continuous prose.

Quality of Written Communication will be assessed in this answer.

[8 marks]

10

END OF QUESTIONS

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