

GCSE Combined Science: Trilogy

Worksheet: Biotic factors

TIME 30 min	TOTAL 30 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Biotic factors

NAME _____	CLASS _____	DATE _____
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

In 2000 there were 300 water voles along 10 km of river. Then mink, a new predator, arrived. In 2009 there were 240.

0 1 . 1 Calculate the percentage decrease in the number of water voles.

.....

.....

.....

.....

Percentage decrease = %

[2 marks]

0 1 . 2 Is the change that caused this a biotic factor or an abiotic factor?
Give a reason for your answer.

.....

.....

[1 mark]

0 2

Biotic factors are living factors that can affect a community.

0 2 . 1

Which **two** of the following are biotic factors?

Tick (✓) **two** boxes.

Arrival of a new predator

☐

Carbon dioxide level

☐

Soil pH

☐

A new pathogen

☐

Wind direction

☐

[2 marks]

0 2 . 2

Give **one** other biotic factor that can affect a community.

.....

.....

[1 mark]

0 2 . 3

A new predator arrives in a habitat.

Suggest what will happen to the number of its prey. Give a reason for your answer.

.....

.....

.....

.....

[2 marks]

0 3

Biotic and abiotic factors can affect a community.

0 3 . 1

Table 1

Factor	Biotic (B) or abiotic (A)
A new strain of virus infects rabbits	
The mean temperature increases	
A new predator arrives in the area	
The amount of food available falls	

Table 1 lists four factors. Write **B** next to each biotic factor and **A** next to each abiotic factor.

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[4 marks]

0 3 . 2

A new pathogen arrives in a population of rabbits.
Suggest what will happen to the number of rabbits. Give a reason for your answer.

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[2 marks]

.....

0 4

A non-native species of crayfish was released into rivers in the UK. The non-native crayfish are larger than the native crayfish and grow faster. They also carry a pathogen that kills native crayfish but does not harm the non-native crayfish.

Table 2 shows the numbers of both species in one river.

Table 2

Year	Number of native crayfish per 100 m of river	Number of non-native crayfish per 100 m of river
2004	85	0
2008	62	14
2012	27	48
2016	6	90
2020	0	112

0 4 . 1

Describe the changes in the numbers of the two species between 2004 and 2020.

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[2 marks]

0 4 . 2

Explain why the number of native crayfish decreased.

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[3 marks]

0 4 . 3

Suggest how the loss of the native crayfish could affect **one** other type of organism in the river.

.....

.....

[1 mark]

0 5

Wood mice feed mainly on acorns from oak trees during the winter. Tawny owls feed mainly on wood mice. The number of acorns produced by the oak trees varies greatly from year to year. Table 3 shows data collected in one wood.

Table 3

Year	Number of acorns per m ² in autumn	Number of wood mice per hectare the following spring	Mean number of owl chicks raised per nest the following spring
2016	12	18	1.2
2017	85	64	2.6
2018	9	15	0.9
2019	60	49	2.2
2020	20	25	1.4

0 5 . 1

Describe the relationship between the number of acorns and the number of wood mice.

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.....

[1 mark]

0 5 . 2

Explain why the number of wood mice depends on the number of acorns.

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.....

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.....

[2 marks]

0 5 . 3

Explain how the number of acorns affects the number of owl chicks raised.

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.....

.....

[2 marks]

0 5 . 4

Calculate the mean number of wood mice per hectare over the five years.

.....

.....

.....

Mean = mice per hectare

[1 mark]

0 6

Ecologists counted water voles before and after mink, a new predator, arrived. Table 4 shows the results.

Table 4

Year	Number of water voles along 10 km of river
1999	590
2009	270

0 6 . 1

Calculate the percentage decrease in the number of water voles.
Give your answer to 3 significant figures.

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.....

.....

.....

Percentage decrease = %

[2 marks]

0 6 . 2

Calculate the mean decrease per year.

.....

.....

.....

.....

Mean decrease per year =

[2 marks]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Combined Science: Trilogy · Worksheet: Biotic factors · 30 marks

Question 1 (3 marks)

01.1 [2 marks]

Answer: 20%

- $(300 - 240) \div 300 \times 100$ (1)
 - 20 (%) (1)
-

01.2 [1 mark]

Answer: Biotic

- biotic, because it involves (a change in) living organisms (1)
-

Question 2 (5 marks)

02.1 [2 marks]

Correct: Arrival of a new predator; A new pathogen

02.2 [1 mark]

- availability of food (1)
- one species outcompeting another (so numbers are too low to breed) (1)
- competition (for food / mates / territory / light) (1)

Any 1 of the points above.

Notes: Do not accept predators or pathogens (given in the question).

02.3 [2 marks]

- the number of prey decreases (1)
 - (because) more prey are eaten / killed (1)
-

Question 3 (6 marks)

03.1 [4 marks]

Answer: B; A; B; B

- new strain of virus: B (1)
- mean temperature: A (1)
- new predator: B (1)
- amount of food: B (1)

03.2 [2 marks]

- the number of rabbits decreases (1)
- the rabbits have no immunity to the new pathogen, so many become infected and die (1)

Question 4 (6 marks)

04.1 [2 marks]

- native crayfish decreased (from 85 to 0 per 100 m) (1)
- non-native crayfish increased (from 0 to 112 per 100 m) (1)

04.2 [3 marks]

- the two species compete for food / space / shelter (1)
- non-native crayfish are larger / grow faster, so they outcompete the native crayfish (1)
- the non-native crayfish spread a new pathogen / disease (1)
- native crayfish have no resistance to the pathogen, so they die (1)
- native numbers became too low to breed (1)

Any 3 of the points above.

04.3 [1 mark]

- animals that ate native crayfish (e.g. otters, fish) could have less food (1)
- the organisms that native crayfish ate could change in number (1)
- (but) the non-native crayfish could replace the native crayfish as food for predators (1)

Any 1 of the points above.

Question 5 (6 marks)

05.1 [1 mark]

- the more acorns there are in autumn, the more wood mice there are the following spring / positive correlation (1)

05.2 [2 marks]

- acorns are the main food of the mice in winter (1)
- so when there are more acorns, more mice survive the winter and breed (1)

05.3 [2 marks]

- more acorns lead to more wood mice, which are the owls' food (1)
- so the owls can feed more chicks, and more chicks survive (1)

05.4 [1 mark]

Answer: 34.2 per hectare

- $171 \div 5 = 34.2$ (1)

Question 6 (4 marks)

06.1 [2 marks]

Answer: 54.2%

- $(590 - 270) \div 590 \times 100$ (1)
- 54.2 (%) (1)

Notes: An answer of 54.24 (not given to 3 significant figures) scores 1 mark.

06.2 [2 marks]

Answer: 32 per year

- $(590 - 270) \div 10$ (1)
 - 32 (1)
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