

GCSE Combined Science: Trilogy

Worksheet: Abiotic factors

TIME 30 min	TOTAL 29 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Abiotic 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

The plants and animals in a community are affected by non-living (abiotic) factors in their environment.

0 1 . 1

Table 1

Abiotic factor	Equipment (letter)
Light intensity	
Soil pH	
Temperature	

Table 1 lists three abiotic factors. Write the letter of the equipment used to measure each factor.

- A balance
- B light meter
- C pH meter
- D thermometer
- E quadrat

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.....

[3 marks]

0 1 . 2

Which **two** of these are abiotic factors that could affect the plants in a field?
Tick (✓) **two** boxes.

- Carbon dioxide level ☐
- Grazing by rabbits ☐
- Soil mineral content ☐
- A new fungal disease ☐
- Competition from weeds ☐

[2 marks]

0 1 . 3

Give **one** other abiotic factor, not mentioned in this question, that can affect a community.

.....

.....

[1 mark]

0 2

Abiotic factors are non-living factors that can affect a community.

0 2 . 1

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

Tick (✓) **two** boxes.

Availability of food

☐

Light intensity

☐

New pathogens

☐

Soil pH

☐

Predators

☐

[2 marks]

0 2 . 2

Give **two** other abiotic factors that can affect a community.

.....

.....

.....

.....

[2 marks]

0 2 . 3

The oxygen level in water is an abiotic factor for aquatic animals.
Why do aquatic animals need oxygen?

.....

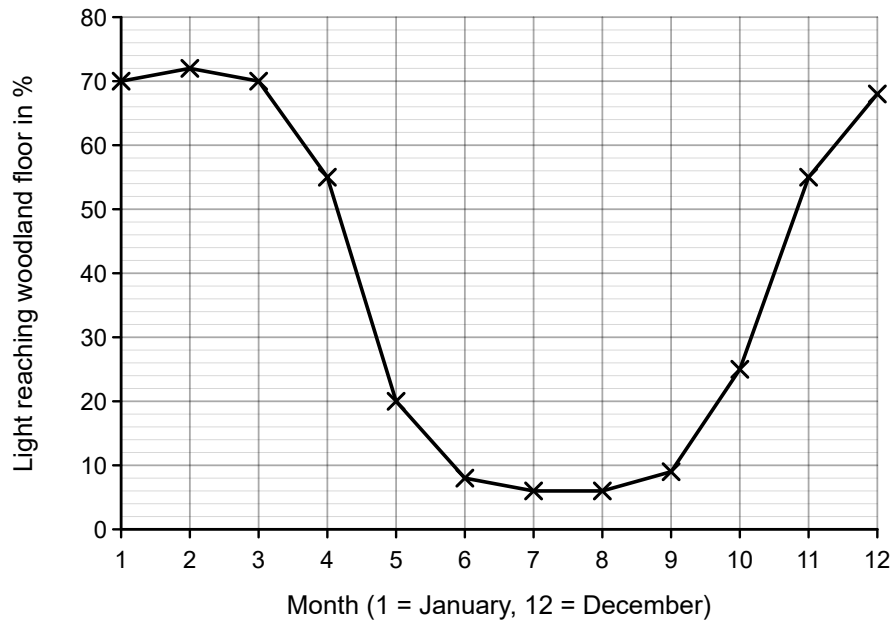
.....

[1 mark]

0 3

Scientists measured the percentage of the light above a deciduous woodland that reached the woodland floor, in each month of one year. Figure 1 shows the results.

Figure 1



0 3 . 1

Describe how the percentage of light reaching the woodland floor changed between March (month 3) and July (month 7).

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[2 marks]

0 3 . 2

Explain the change you described.

.....

.....

[1 mark]

0 3 . 3

Suggest why plants on the woodland floor grow slowly in July, even though the temperature is high.

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.....

.....

.....

[2 marks]

0 3 . 4

Give **one** abiotic factor, other than light intensity and temperature, that is likely to change on the woodland floor during the year.

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.....

[1 mark]

0 4

A student compared hawthorn trees growing on an exposed hilltop with hawthorn trees growing in a sheltered valley nearby. Table 2 shows the results.

Table 2

Measurement	Hilltop	Valley
Mean wind speed in m/s	8.2	2.1
Mean height of hawthorn trees in m	2.4	6.8
Mean number of plant species per quadrat	6	14

0 4 . 1

Calculate how many times greater the mean wind speed was on the hilltop than in the valley.

Give your answer to 2 significant figures.

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.....

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Number of times =

[1 mark]

0 4 . 2

Suggest **two** reasons why the hawthorn trees on the hilltop are shorter than the trees in the valley.

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[2 marks]

0 4 . 3

All of the trees on the hilltop lean towards the east.
Suggest what this shows about the wind on the hilltop.

.....

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[1 mark]

0 4 . 4

Suggest why fewer species of plant grow on the hilltop.

.....

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.....

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[2 marks]

.....

0 5

A factory releases warm water into a river. Scientists measured the water temperature and the concentration of dissolved oxygen at different distances downstream from the factory. They also counted the mayfly nymphs in samples taken from the river bed. Table 3 shows the results.

Table 3

Distance downstream from factory in m	Water temperature in °C	Concentration of dissolved oxygen in mg/dm ³	Mean number of mayfly nymphs per sample
0	24	6.1	3
200	21	7.2	11
400	18	8.4	26
600	16	9.3	38
800	15	9.6	41

0 5 . 1

Describe the relationship between the concentration of dissolved oxygen and the number of mayfly nymphs.

.....

.....

[1 mark]

0 5 . 2

Mayfly nymphs need water with a high concentration of dissolved oxygen. Use Table 3 to explain the distribution of mayfly nymphs in the river.

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.....

[3 marks]

0 5 . 3

The scientists took several samples at each distance and calculated a mean.
Give **one** reason why.

[1 mark]

0 5 . 4

Suggest **one** other abiotic factor the scientists should measure before
concluding that oxygen concentration affects the distribution of mayfly nymphs.

[1 mark]

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: Abiotic factors · 29 marks

Question 1 (6 marks)

01.1 [3 marks]

Answer: B; C; D

- light intensity: B (1)
 - soil pH: C (1)
 - temperature: D (1)
-

01.2 [2 marks]

Correct: Carbon dioxide level; Soil mineral content

01.3 [1 mark]

- moisture level / amount of water (1)
- wind intensity / wind direction (1)
- oxygen level (for aquatic animals) (1)

Any 1 of the points above.

Question 2 (5 marks)

02.1 [2 marks]

Correct: Light intensity; Soil pH

02.2 [2 marks]

- temperature (1)
- moisture level / amount of water (1)
- soil mineral content (1)
- wind intensity / direction (1)
- carbon dioxide level (for plants) (1)
- oxygen level (for aquatic animals) (1)

Any 2 of the points above.

Notes: Do not accept light intensity or soil pH.

02.3 [1 mark]

Answer: For aerobic respiration

- for (aerobic) respiration (1)
-

Question 3 (6 marks)

03.1 [2 marks]

- it decreased (1)
 - detail: the fastest decrease was between April and May / it levelled off between June and July / use of data, e.g. from about 70% to about 6% (1)
-

03.2 [1 mark]

- leaves grew / opened on the trees and absorbed / blocked the light (1)
-

03.3 [2 marks]

- light intensity is low (only about 6% of the light reaches the floor) (1)
 - (so) light limits the rate of photosynthesis / less glucose is made for growth (1)
-

03.4 [1 mark]

- moisture level / amount of water in the soil (1)
- wind intensity / direction (1)
- soil mineral content (1)
- carbon dioxide level (1)

Any 1 of the points above.

Question 4 (6 marks)

04.1 [1 mark]

Answer: 3.9

- $8.2 \div 2.1 = 3.9$ (1)

Notes: An answer of 3.905 (not given to 2 significant figures) scores 0 marks.

04.2 [2 marks]

- strong wind breaks / damages branches and shoots (1)
- wind increases the rate of transpiration, so less water is available for growth (1)
- it is colder on the hilltop, so photosynthesis / growth is slower (1)
- the soil may be thinner / contain fewer mineral ions (1)

Any 2 of the points above.

04.3 [1 mark]

- the wind usually blows from the west (1)

04.4 [2 marks]

- the conditions on the hilltop are harsher, e.g. windier, colder or drier (1)
 - only species that are adapted to / can tolerate these conditions can survive there (1)
-

Question 5 (6 marks)

05.1 [1 mark]

- as the concentration of dissolved oxygen increases, the number of mayfly nymphs increases / positive correlation (1)
-

05.2 [3 marks]

- the water is warmest near the factory (1)
- warmer water contains less dissolved oxygen (1)
- near the factory, nymphs cannot get enough oxygen for (aerobic) respiration, so few survive (1)
- further downstream the water is cooler and contains more oxygen, so more nymphs survive (1)

Any 3 of the points above.

05.3 [1 mark]

- to reduce the effect of an unusual sample / anomaly / so the result is more representative / accurate (1)
-

05.4 [1 mark]

- pH (1)
- speed of water flow (1)
- concentration of pollutants / chemicals from the factory (1)
- light intensity (1)
- type of river bed (1)

Any 1 of the points above.

Notes: Do not accept temperature (already measured).
