AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.7.1.2

Abiotic factors

Past-paper questions

Tier	**Higher**
Question groups	**4**
Available paper years	**2018–2023**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.7.1.2 Abiotic factors

Question 01

June 2018 | 8464/B/2H | Original Q1

0 1 Many biotic and abiotic factors can affect the growth of plants.

0 1 . 1 Are the factors in **Table 1** biotic or abiotic?

[2 marks]

Tick **one** box for each factor.

Table 1

Factor	Biotic	Abiotic
Diseases		
Herbivores		
Temperature		
Water		

Two students investigated the effect of light intensity on the distribution of small plants.

The plants are growing under a tree in a park.

The students made the following hypothesis:

‘As you move outwards from a tree there will be more plant growth.’

0 1 . 2 Explain why the students thought their hypothesis would be correct.

[3 marks]

Question 01 · continued

0 1 . 3 The students used two pieces of equipment.

Give the scientific name of each piece of equipment.

[2 marks]

A square frame measuring 0.5 m × 0.5 m _____

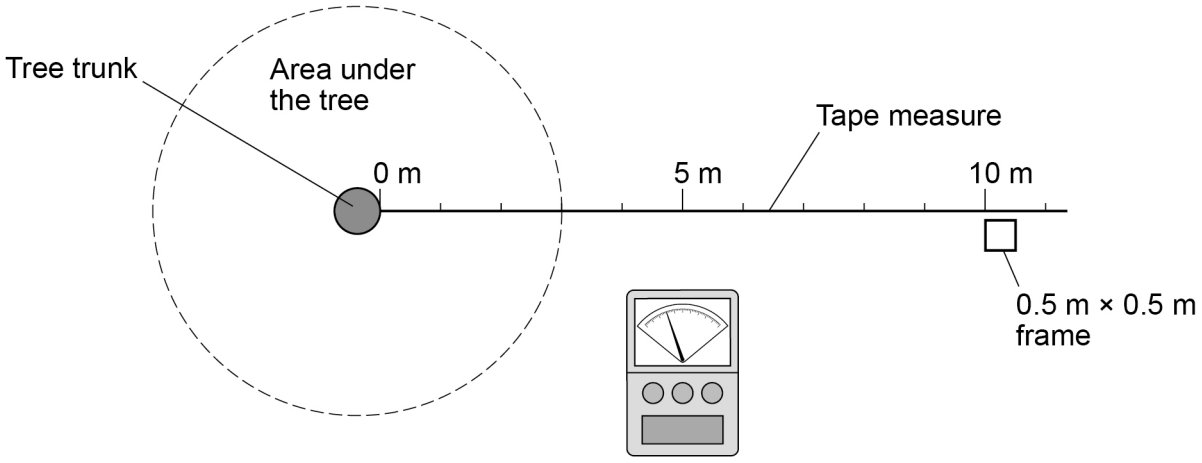
An electronic device to measure light intensity _____

This is the method used.

1. Fix one end of a tape measure at the base of the tree.
2. Fix the other end of the tape measure 11 metres from the tree.
3. At 0 metres put the square frame on the ground.
4. Identify all the plant species growing inside the frame.
5. Estimate and record the percentage cover of each plant species.
6. Measure the light intensity inside the frame.
7. Put the square frame on the ground every 2 metres along the tape to 10 metres.
8. Repeat steps 4 – 6 in every frame.

Figure 1 shows the equipment in this investigation.

Figure 1



0 1 . 4 Calculate the total area sampled.

[1 mark]

_____

_____

Total area sampled = _____ m^2

4.7.1.2 Abiotic factors

Question 01 · continued

0 1 . 5 The whole investigation was done as quickly as possible on the same day.

Suggest **one** reason why.

[1 mark]

0 1 . 6 Give **one** way the investigation could be improved.

[1 mark]

Table 2 shows the results.

Table 2

	Distance from tree in metres					
	0	**2**	**4**	**6**	**8**	**10**
Percentage cover of grass	15	50	35	16	15	15
Percentage cover of plantain	0	5	10	40	25	30
Percentage cover of daisy	0	0	0	4	20	10
Percentage cover of clover	1	10	25	40	40	45
Total percentage cover of plants	16	65	70	100	100	100
Light intensity in arbitrary units	37	59	150	175	>200	>200

0 1 . 7 Which plant species in **Table 2** will only grow at high light intensity?

[1 mark]

4.7.1.2 Abiotic factors

Question 01 · continued

0 1 . 8 What conclusion can be made about the relationship between light intensity and the total percentage cover of plants?

Use data from **Table 2** in your answer.

[2 marks]

0 1 . 9 Light intensity might **not** be the cause of this pattern of plant distribution.

Suggest **one** different factor that may cause these results.

Give **one** reason for your answer.

[2 marks]

Factor

Reason

15

4.7.1.2 Abiotic factors

Question 02

June 2019 | 8464/B/2H | Original Q5

0 5 Some students estimated the population of daisies in a school field.

This is the method used.

1. Find a place where some daisies are growing.
2. Put the quadrat down.
3. Count and record the number of daisies in the quadrat.
4. Repeat steps 1–3 at four different places in the field.
5. Calculate the mean number of daisies per quadrat.
6. Use the data to estimate the total number of daisies in the field.

0 5 . 1 Which **two** improvements would increase the validity of this method?

[2 marks]

Tick (✓) **two** boxes.

- Do not put any quadrats near trees. ☐
- Repeat for another ten quadrats. ☐
- Use a long tape measure. ☐
- Use a random method to place the quadrats. ☐
- Use the same person to place all the quadrats. ☐

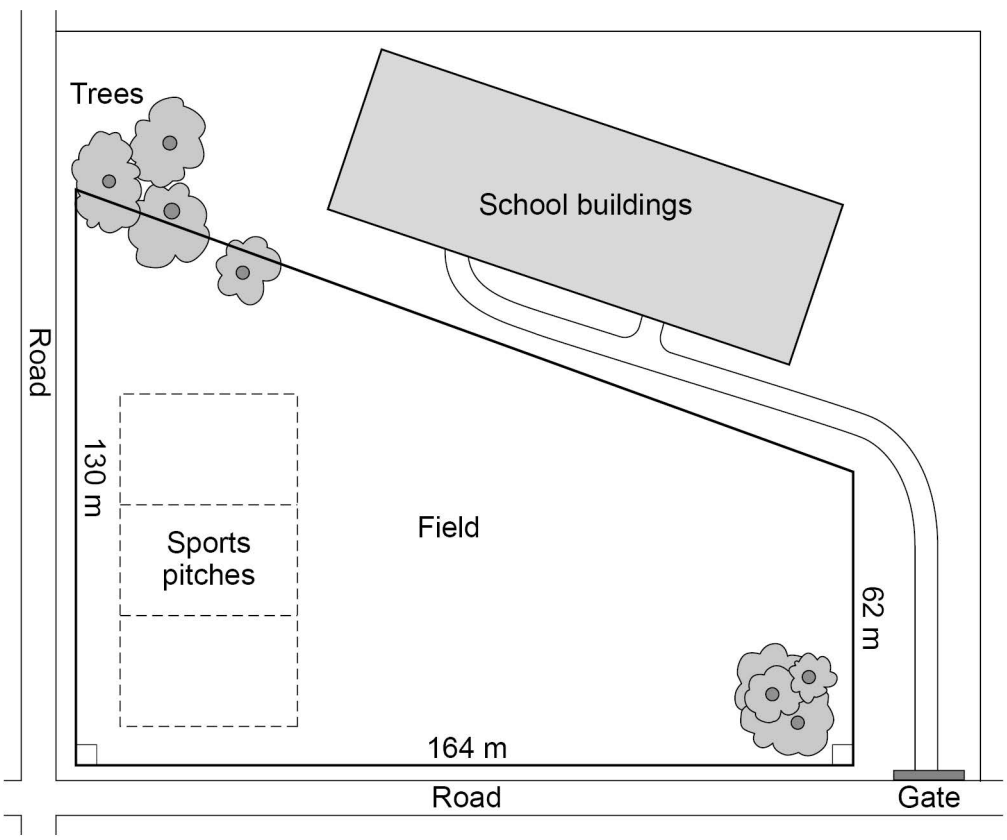
Question 5 continues on the next page

0 5 . 2 With an improved method the students calculated the mean number of daisy plants to be 7.65 per quadrat.

The students used a quadrat measuring 50 cm × 50 cm

Figure 3 shows the school site and the dimensions of the school field.

Figure 3



4.7.1.2 Abiotic factors

Question 02 · continued

Calculate the population of daisy plants on the school field.

Give your answer in standard form to 2 significant figures.

[5 marks]

Population of daisy plants = _____

Question 5 continues on the next page

4.7.1.2 Abiotic factors

Question 02 · continued

0 5 . 3 The students noticed a very uneven distribution of daisy plants in the field.

Explain how different biotic factors **and** abiotic factors could have caused an uneven distribution of daisy plants.

Use **Figure 3** on page 20.

[6 marks]

13

4.7.1.2 Abiotic factors

Question 03

June 2022 | 8464/B/2H | Original Q3

0 3 On a school field:

- one area of the soil was usually wet
- another area of the soil was usually dry.

Students investigated the effect of water in the soil on the number of buttercup plants growing in each area.

0 3 . 1 Water is an abiotic factor.

Name **one biotic** factor which may affect the number of buttercups growing on the field.

[1 mark]

0 3 . 2 Describe a method to investigate if the amount of water in the soil affects the number of buttercups in the field.

[6 marks]

7

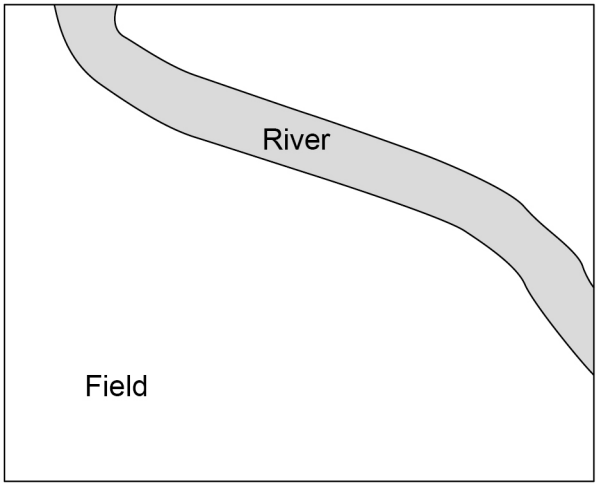
4.7.1.2 Abiotic factors

Question 04

June 2023 | 8464/B/2H | Original Q3

0 3 **Figure 1** shows a river next to a field.

Figure 1



0 3 . 1 Describe a method to investigate how the distance from the river affects the number of different plant species in the field.

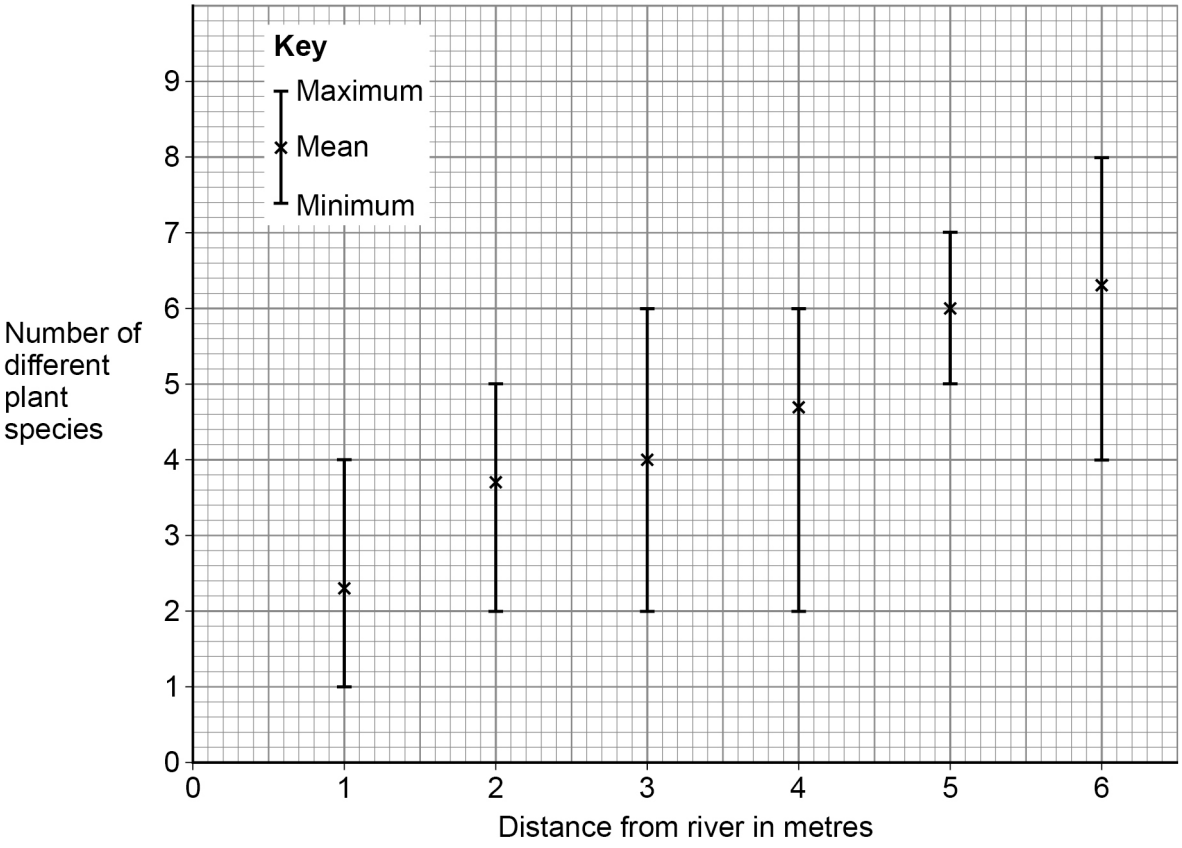
You should explain how to use a transect in your method.

[4 marks]

0 3 . 2 Students used a valid method to investigate how the distance from the river affects the number of different plant species in the field.

Figure 2 shows the results.

Figure 2



What is shown by the data in **Figure 2**?

[1 mark]

Tick (✓) **one** box.

Fewer different species are always recorded nearer to the river. ☐

The mean value students can be most certain about is 5 metres from the river. ☐

The number of species recorded 6 metres from the river is anomalous. ☐

Question 3 continues on the next page

4.7.1.2 Abiotic factors

Cows walk on the ground near the river more than they walk on the ground further from the river.

0 3 . 3 Which is an **abiotic** factor that could affect the number of different plant species found near the river?

[1 mark]

Tick (✓) **one** box.

- Microorganisms near the roots ☐
- Moisture levels in the soil ☐
- Oxygen concentration in the air ☐
- Primary consumers in the field ☐

4.7.1.2 Abiotic factors

Question 04 · continued

0 3 . 4 Increasing numbers of cows are being farmed across the world.

Explain the environmental implications of increasing numbers of cows being farmed.

[6 marks]

12