AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.7.2.1

Levels of organisation

Past-paper questions

Tier	**Foundation**
Question groups	**8**
Available paper years	**2019–2025**

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.

4.7.2.1 Levels of organisation

Question 01

June 2019 | 8464/B/2F | Original Q2

0 2 Some students estimated the population of daisy plants in a field.

This is the method used.

1. Place a quadrat randomly on the field.
2. Count and record the number of daisy plants in the quadrat.
3. Repeat steps 1 and 2 another four times.

0 2 . 1 How could the students have made sure the quadrats were placed randomly?

[1 mark]

0 2 . 2 Describe the piece of equipment called a quadrat.

[1 mark]

Table 1 shows the results.

Table 1

Quadrat number	Number of daisy plants
1	8
2	11
3	4
4	6
5	16
Mean	**X**

0 2 . 3 Calculate mean value **X**.

[1 mark]

X = _____ daisy plants

4.7.2.1 Levels of organisation

Question 01 · continued

0 2 . 4 The field is a rectangle 100 m wide and 150 m long.

Calculate the area of the field.

[1 mark]

Area = _____ m^2

0 2 . 5 The quadrat used by the students had an area of 1.0 m^2

Estimate the population of daisy plants in the field.

Use your answers to Question **02.3** and Question **02.4**

[2 marks]

Estimated population = _____ daisy plants

0 2 . 6 More daisy plants grew in some parts of the field compared to other areas of the field.

Give **two** biotic factors that may affect where daisy plants grow in the field.

[2 marks]

1 _____

2 _____

0 2 . 7 The students noticed that the daisy plants growing near a building were smaller.

Explain why smaller daisy plants grew near the building.

[2 marks]

10

4.7.2.1 Levels of organisation

Question 02

0 5 **Figure 4** shows a food chain in a garden.

Figure 4


bean plant →

blackfly →

spider →

blackbird

0 5 . 1 Which term describes the spider in this food chain?

[1 mark]

Tick (✓) **one** box.

- Primary consumer ☐
- Producer ☐
- Secondary consumer ☐
- Tertiary consumer ☐

0 5 . 2 Many of the spiders in the garden died.

What is likely to happen to the number of blackflies in the garden?

[1 mark]

Tick (✓) **one** box.

- Decrease ☐
- Increase ☐
- Stay the same ☐

0 5 . 3 Give a reason for your answer to Question **05.2**

[1 mark]

4.7.2.1 Levels of organisation

Question 02 · continued

Table 2 shows the estimated biomass of organisms in the garden.

Table 2

Organism	Biomass in g
Bean plants	225
Blackflies	115
Spiders	65
Blackbirds	10

0 5 . 4 What conclusion can be made about biomass in food chains?

[1 mark]

4.7.2.1 Levels of organisation

Question 02 · continued

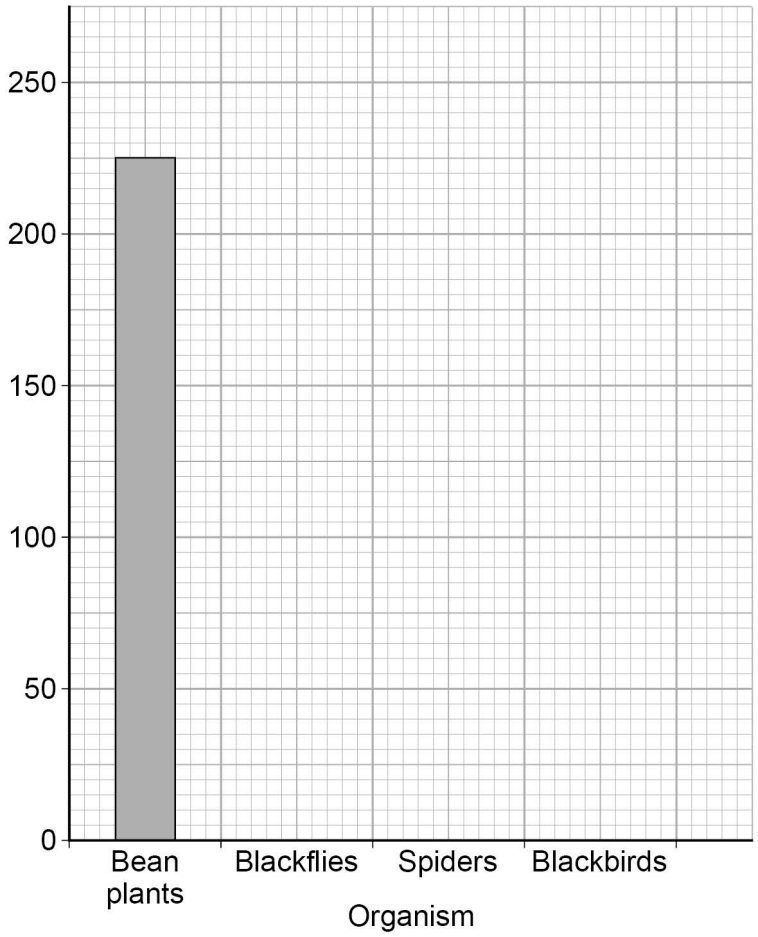
0 5 . 5 Complete **Figure 5**.

You should:

- label the y-axis
- plot the data from **Table 2**.

[3 marks]

Figure 5



0 5 . 6 Explain why a garden is **not** a stable community.

[2 marks]

9

4.7.2.1 Levels of organisation

Question 03

November 2020 | 8464/B/2F | Original Q5

0 5 This question is about biodiversity.

A farmer:

- grows only wheat crops
- has used all his small fields to make a few large fields
- cuts down trees in his woodlands to burn as fuel.

0 5 . 1 What are **two** ways the farmer could increase biodiversity on his farm?

[2 marks]

Tick (✓) **two** boxes.

Cut down trees to grow wheat	☐
Plant hedgerows around his fields	☐
Plant many different crops in his fields	☐
Put fences around his fields	☐
Put fertiliser on his wheat crop	☐

4.7.2.1 Levels of organisation

Question 03 · continued

Students investigated the effect of cutting down trees in the woodland.

This is the method used.

1. Mark out a 10 m by 10 m area where trees have been removed.
2. Place a 1 m × 1 m quadrat at six random positions in the area.
3. Record the number of plant species present.
4. Record the number of invertebrate species seen among dead leaves on the ground.
5. Repeat steps 1 to 4 in an area where there are trees.

0 5 . 2 Suggest **one** improvement the students could make to their method.

[1 mark]

0 5 . 3 The students made this prediction:

'There will be more invertebrate species living in the area where there are trees.'

Explain why the students' prediction may be correct.

[2 marks]

Question 5 continues on the next page

4.7.2.1 Levels of organisation

Question 03 · continued

Table 1 shows the students' results.

Table 1

Quadrat	Number of plant species		Number of invertebrate species	
	Area with no trees	Area with trees	Area with no trees	Area with trees
1	8	2	4	10
2	6	2	3	6
3	7	0	4	8
4	6	3	5	14
5	20	4	2	9
6	8	1	6	13
Mean	7	2	4	10

0 5 . 4 The students decided that one result was anomalous.

Draw a ring around the anomalous result in **Table 1**.

[1 mark]

0 5 . 5 How does removing trees affect the number of invertebrate species living among the dead leaves on the ground?

Use **Table 1**.

[1 mark]

4.7.2.1 Levels of organisation

Question 03 · continued

0 5 . 6 There were more plant species growing in the area where there were no trees.

Explain why.

[3 marks]

10

Turn over for the next question

4.7.2.1 Levels of organisation

Question 04

November 2021 | 8464/B/2F | Original Q3

0 3 **Figure 2** shows one species of bird on a bird feeder.

Figure 2



The birds use their beaks to reach nuts inside the bird feeder.

Cats sometimes eat the birds.

0 3 . 1 Give the food chain for the birds, cats and nuts.

[2 marks]

0 3 . 2 Which organism in the food chain you gave in Question **03.1** is the primary consumer?

[1 mark]

4.7.2.1 Levels of organisation

Question 04 · continued

0 3 . 3 Cats are one biotic factor that affects the size of the bird population.

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

[2 marks]

Tick (✓) **two** boxes.

- Food ☐
- Pathogens ☐
- Sunlight ☐
- Temperature ☐
- Water ☐

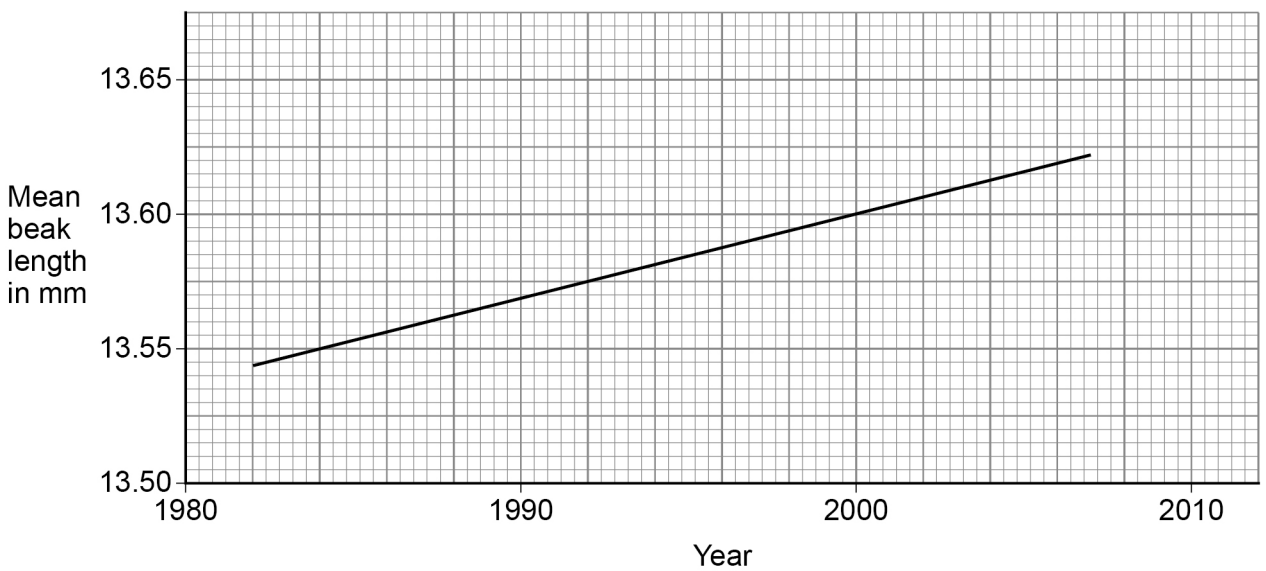
Question 3 continues on the next page

4.7.2.1 Levels of organisation

Question 04 · continued

Figure 3 shows the mean beak length of this species of bird from 1982 to 2007.

Figure 3



0 3 . 4 What was the mean beak length in 2000?

[1 mark]

Mean beak length = _____ mm

0 3 . 5 What type of adaptation is beak length?

[1 mark]

Tick (✓) **one** box.

- Behavioural ☐
- Chemical ☐
- Structural ☐

4.7.2.1 Levels of organisation

Question 04 · continued

Figure 3 shows evidence of evolution in this species of bird.

0 3 . 6 Scientists have concluded that beak length in this species of bird is increasing.

Complete the sentences about the evolution of this species of bird.

Choose answers from the box.

[4 marks]

excretion	**generation**	**mutation**
reproduction	**respiration**	**variation**

The difference in beak length in the bird population

is called _____ .

A change in a gene affects the beak length.

Change in a gene is called _____ .

The birds with the longest beaks get more food.

Getting more food improves a bird's chances of

survival and _____ .

This process of evolution takes place over more

than one _____ .

Question 3 continues on the next page

4.7.2.1 Levels of organisation

Question 04 · continued

0 3 . 7 Birds of this species:

- live for about 3 years
- produce up to 24 eggs every year.

Why is evolution easier to study in birds than in humans?

[1 mark]

Tick (✓) **one** box.

Birds breed less frequently than humans. ☐

Birds have a shorter life cycle than humans. ☐

Birds have fewer offspring than humans. ☐

0 3 . 8 Bacteria also provide evidence for evolution.

Which statement describes evidence for evolution?

[1 mark]

Tick (✓) **one** box.

Bacteria can become resistant to antibiotics. ☐

Decomposition can be caused by bacteria. ☐

Some bacteria are pathogens. ☐

13

4.7.2.1 Levels of organisation

Question 05

June 2022 | 8464/B/2F | Original Q2

0 2 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.

On the field the students marked out:

- an area of 10 m by 10 m on the wet soil
- an area of 10 m by 10 m on the dry soil.

0 2 . 1 Describe how a quadrat can be used to measure the size of the buttercup population on the wet soil area.

[4 marks]

4.7.2.1 Levels of organisation

Question 05 · continued

0 2 . 2 What type of factor is water in the soil?

[1 mark]

Tick (✓) **one** box.

A biotic factor ☐

A control factor ☐

An abiotic factor ☐

0 2 . 3 Give **two** factors which might affect the number of buttercups growing on the school field.

Do **not** refer to water in your answer.

[2 marks]

1 _____

2 _____

0 2 . 4 Complete the sentence.

Choose the answer from the box.

[1 mark]

a control	**the dependent**	**the independent**

In this investigation the number of buttercups in each quadrat was

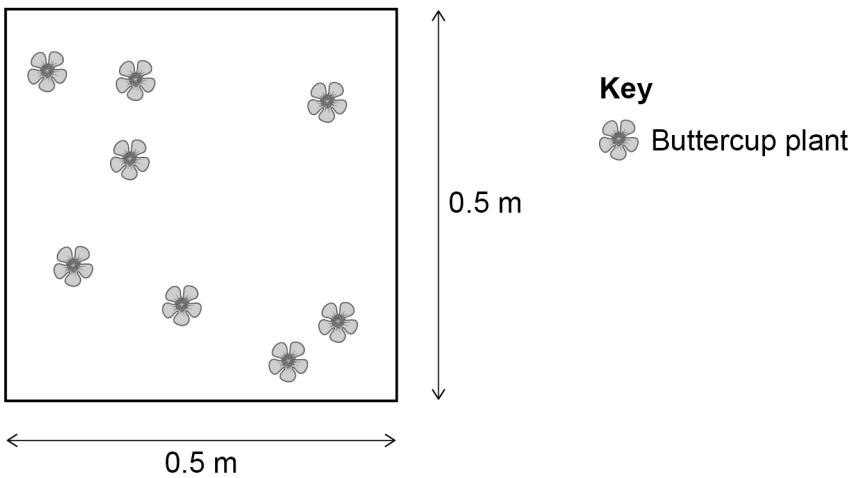
_____ variable.

Question 2 continues on the next page

Question 05 · continued

Figure 2 shows a quadrat on an area of the school field.

Figure 2



0 2 . 5 Calculate the area of the quadrat.

[1 mark]

Area of the quadrat = _____ m^2

0 2 . 6 The mean number of buttercups in one quadrat was 8

Calculate the number of buttercups per m^2

Use your answer from Question **02.5**

[2 marks]

Number of buttercups = _____ per m^2

4.7.2.1 Levels of organisation

Question 05 · continued

In a laboratory another group of students investigated the effect of soil acidity on the growth of beans.

This is the method used.

1. Put soil with a neutral pH in two large boxes.
2. Add acid to the soil in one box.
3. Plant some bean seeds in each box.
4. Water the seeds over 3 weeks.
5. After 3 weeks, measure the height of the bean plants in each box.
6. Calculate the mean height of bean plants in each box.

0 2 . 7 Give **two** improvements the students could make to the method to give more valid results.

[2 marks]

1 _____

_____

2 _____

_____

The students then carried out a valid investigation.

Table 1 shows the students' results.

Table 1

	Height of bean plants in cm	
Bean plant	**Acid soil**	**Neutral soil**
1	8	11
2	6	12
3	4	11
4	10	17
5	7	19
Mean	7	**X**

0 2 . 8 Calculate mean value **X** in **Table 1**.

[2 marks]

X = _____ cm

0 2 . 9 What conclusion can the students make about the effect of acid soil on the growth of bean plants?

[1 mark]

_____

_____

16

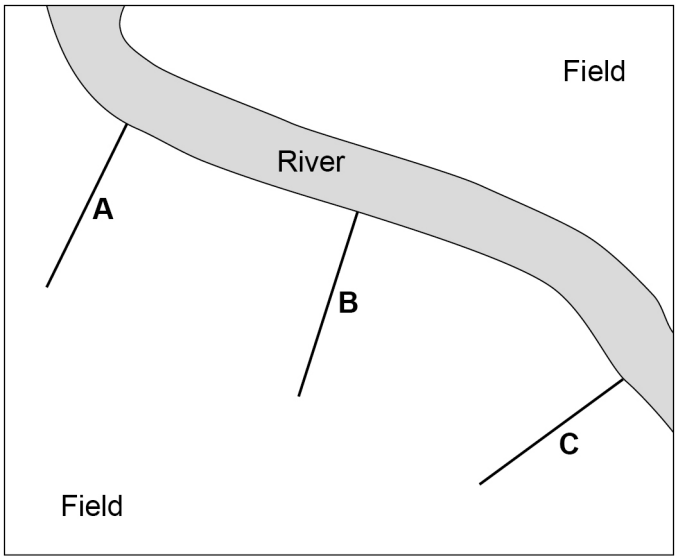
4.7.2.1 Levels of organisation

Question 06

0 3 A student investigated how the distance from a river affects the number of different plant species.

Figure 3 shows a river between two fields.

Figure 3



0 3 . 1 **A**, **B** and **C** show the positions of three transects.

Where should the student position another transect for this investigation?

Draw the extra transect line on **Figure 3**.

[1 mark]

4.7.2.1 Levels of organisation

Question 06 · continued

0 3 . 2 The student recorded the number of different plant species at 1 m intervals along each transect.

Which piece of equipment should be used at 1 m intervals along the transect?

[1 mark]

Tick (✓) **one** box.

Microscope ☐

Quadrat ☐

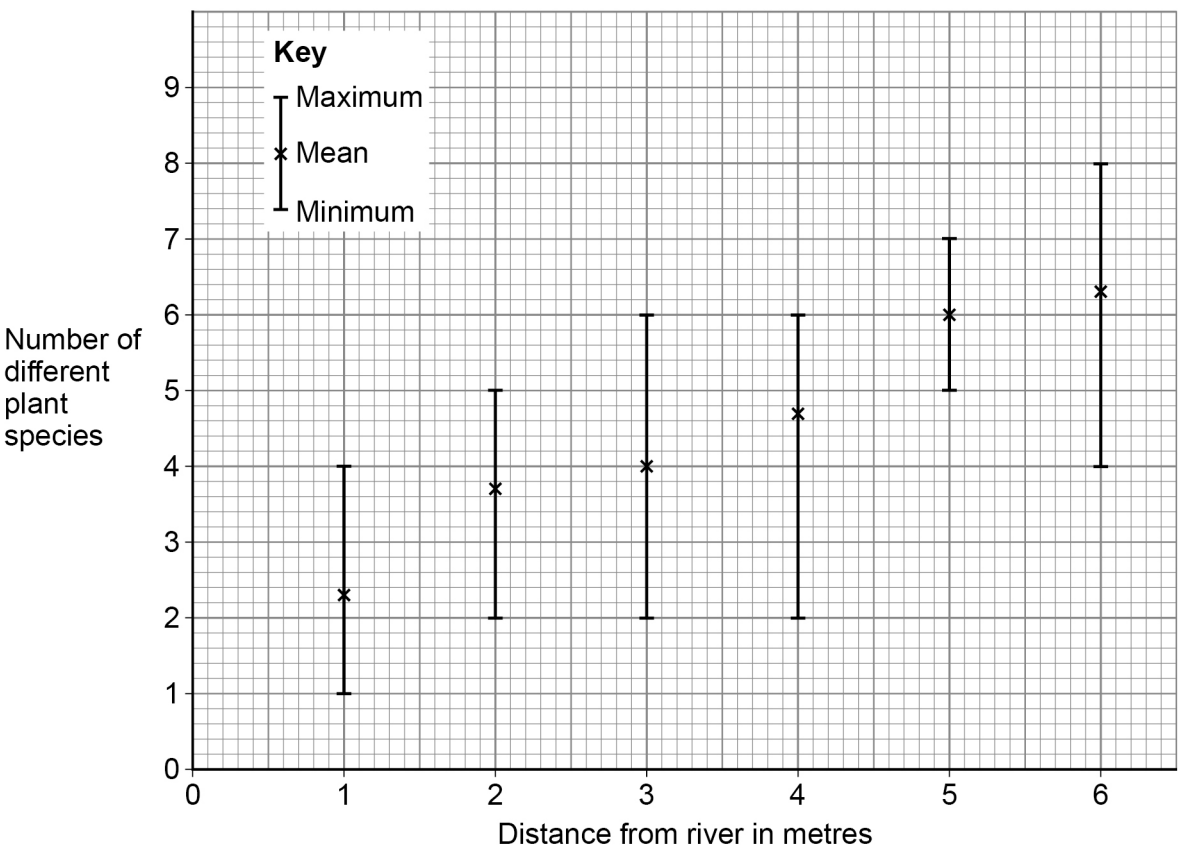
Timer ☐

Question 3 continues on the next page

Question 06 · continued

Figure 4 shows the results.

Figure 4



0 3 . 3 What was the mean number of different plant species 5 m from the river?

[1 mark]

Mean = _____

0 3 . 4 What is the effect of increasing distance from the river on the mean number of different plant species?

[1 mark]

_____

_____

4.7.2.1 Levels of organisation

Question 06 · continued

0 3 . 5 The minimum and maximum values on **Figure 4** show the range of results at each distance from the river.

Why is it useful to know the range of results?

[1 mark]

Tick (✓) **one** box.

- To calculate the mean result ☐
- To know the uncertainty of the mean ☐
- To show the mode of the results ☐

0 3 . 6 Cows are kept in the fields.

Fewer plants are found where the cows often walk on the ground.

The number of cows is one **biotic** factor that affects the number of plants.

Which **two** factors are **abiotic** factors?

[2 marks]

Tick (✓) **two** boxes.

- Consumers ☐
- Light intensity ☐
- Moisture levels ☐
- Pathogens ☐
- Predators ☐

Question 3 continues on the next page

4.7.2.1 Levels of organisation

Question 06 · continued

0 3 . 7 Explain why a decrease in the number of plants across the world increases global warming.

[2 marks]

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4.7.2.1 Levels of organisation

Question 07

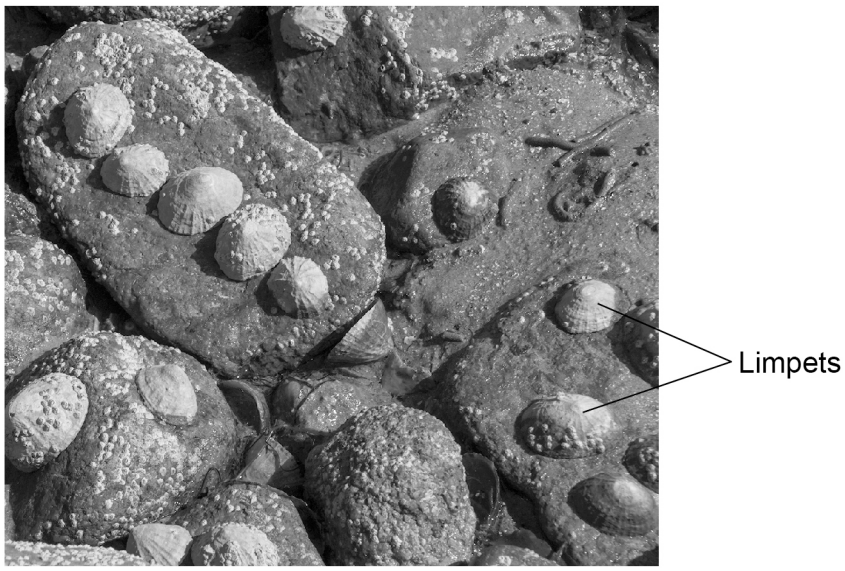
June 2024 | 8464/B/2F | Original Q5

0 5 Limpets are small animals with shells.

Limpets attach to rocks on sea shores.

Figure 9 shows limpets on rocks.

Figure 9



0 5 . 1 Limpets eat algae.

Limpets are prey for crabs.

Give the food chain for algae, crabs and limpets.

[1 mark]

Question 5 continues on the next page

4.7.2.1 Levels of organisation

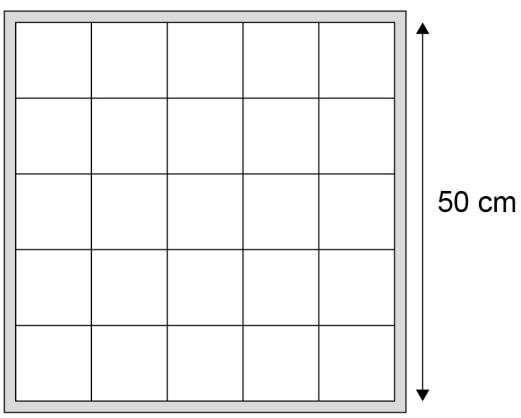
Question 07 · continued

Students estimated the population of limpets on a sea shore.

The students were given a square quadrat.

Figure 10 shows the quadrat.

Figure 10



0 5 . 2 Calculate the area of the quadrat in m^2.

[2 marks]

Area of quadrat = _____ m^2

4.7.2.1 Levels of organisation

Question 07 · continued

0 5 . 3 The total area of the sea shore was 1800 m^2.

The students sampled 2% of the total area of the sea shore.

Calculate the number of times the students needed to use the quadrat for the 2% sample.

Use your answer from Question **05.2**

[2 marks]

Number of times = _____

0 5 . 4 Explain why throwing a quadrat is **not** a random method to estimate population size.

Do **not** refer to safety in your answer.

[2 marks]

Question 5 continues on the next page

4.7.2.1 Levels of organisation

Question 07 · continued

June 2024 | 8464/B/2F | Original Q5

0 5 . 5 Describe **one** method the students could use to plan where the quadrat should be randomly placed each time.

[2 marks]

0 5 . 6 Suggest **one** hazard the students should be aware of when collecting data on the sea shore.

Do **not** refer to throwing quadrats in your answer.

[1 mark]

0 5 . 7 Populations of limpets are monitored to assess the impact of pollution in water.

Suggest **one** type of pollution in water that may affect the population of limpets.

[1 mark]

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4.7.2.1 Levels of organisation

Question 08

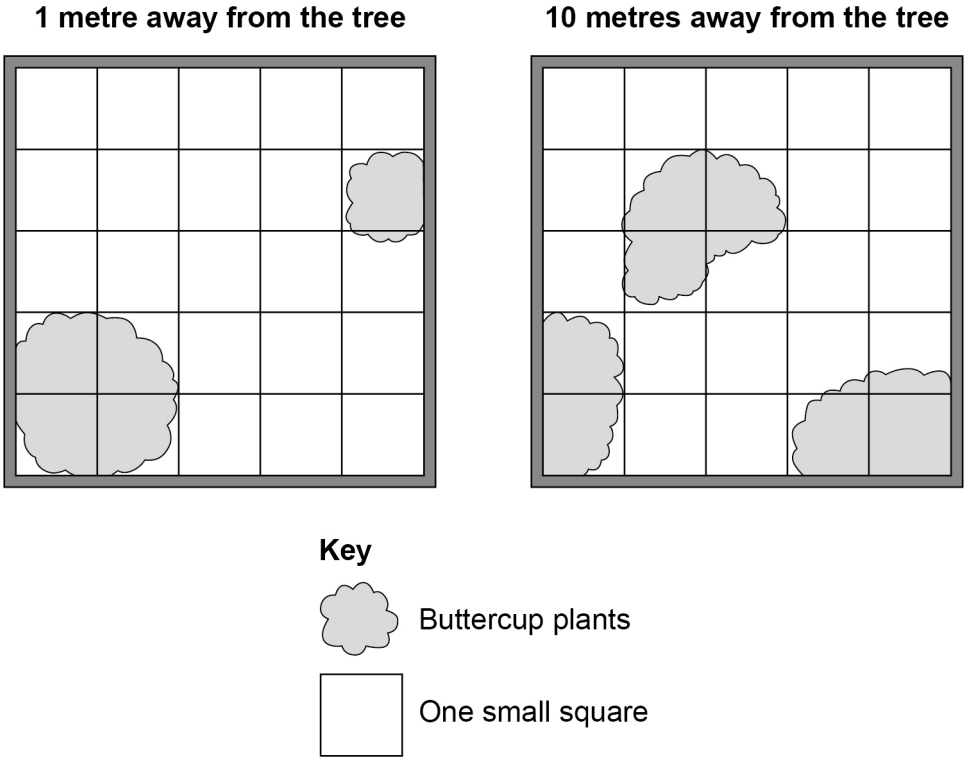
June 2025 | 8464/B/2F | Original Q3

0 3 Buttercups are small plants.

A student investigated the distribution of buttercup plants at different distances from a tree.

Figure 4 shows a piece of equipment being used to sample two areas.

Figure 4



0 3 . 1 What is the scientific name of the equipment shown in **Figure 4**?

[1 mark]

Tick (✓) **one** box.

Grid ☐

Quadrat ☐

Transect ☐

4.7.2.1 Levels of organisation

Question 08 · continued

0 3 . 2 Each small square on **Figure 4** represents a percentage cover of 4%.

The student counted every small square that was **at least half** covered by buttercup plants.

At 1 metre away from the tree, buttercup plants had a percentage cover of 20%.

Determine the percentage cover of buttercup plants at **10 metres** away from the tree.

Use **Figure 4**.

[2 marks]

Percentage cover = _____ %

0 3 . 3 What is the independent variable in the investigation?

[1 mark]

Tick (✓) **one** box.

- Distance from the tree ☐
- Number of species ☐
- Time of year ☐

0 3 . 4 What is an advantage of calculating percentage cover instead of counting the number of buttercup plants in an area?

[1 mark]

Tick (✓) **one** box.

- Percentage cover is affected by the number and size of individual plants. ☐
- Percentage cover is always the same for individual plants of any species. ☐
- Percentage cover is larger than the number of individual plants. ☐

Question 08 · continued

The student investigated the percentage cover of buttercup plants around a different tree.

Table 2 shows the results.

Table 2

Distance from the tree in metres	Percentage (%) cover					
	Result 1	Result 2	Result 3	Result 4	Result 5	Mean
1	12	8	4	12	4	**X**
10	24	12	8	28	8	16

0 3 . 5 Calculate mean value **X** in **Table 2**.

[2 marks]

X = _____ %

0 3 . 6 Give **one** conclusion about the effect of distance from the tree on the percentage cover of buttercup plants.

Use **Table 2**.

[1 mark]

4.7.2.1 Levels of organisation

Question 08 · continued

0 3 . 7 Give **two** other factors that affect the percentage cover of buttercup plants around the tree.

Do **not** refer to distance from the tree.

[2 marks]

1 _____

_____

2 _____

_____

0 3 . 8 **Table 2** shows the results of the investigation.

Suggest **two** improvements to the investigation.

[2 marks]

1 _____

_____

2 _____

_____

12