

Organisation of an Ecosystem

Question Paper 1

Level	GCSE (9-1)
Subject	Combined Science – Trilogy - Biology
Exam Board	AQA
Topic	4.7 Ecology
Sub-Topic	Organisation of an Ecosystem
Difficulty Level	Bronze Level
Booklet	Question Paper 1

Time Allowed: 56 minutes

Score: / 56

Percentage: /100

Grade Boundaries:

Q1. Moose are animals that eat grass.

Figure 1 shows a moose.

Figure 1



© Wildnerdpix/iStock/Thinkstock

Figure 2 shows a food chain.

Figure 2

Grass → Moose → Wolves

(a) What word describes the grass in **Figure 2**?

Tick **one** box.

Consumer

☐

Predator

☐

Prey

☐

Producer

☐

(1)

(b) What word describes the wolves in **Figure 2**?

Tick **one** box.

Communities

☐

Predators

☐

Prey

☐

Producers

☐

(1)

- (c) **Figure 3** and **Figure 4** show how the moose population and the wolf population changed in one area.

Figure 3

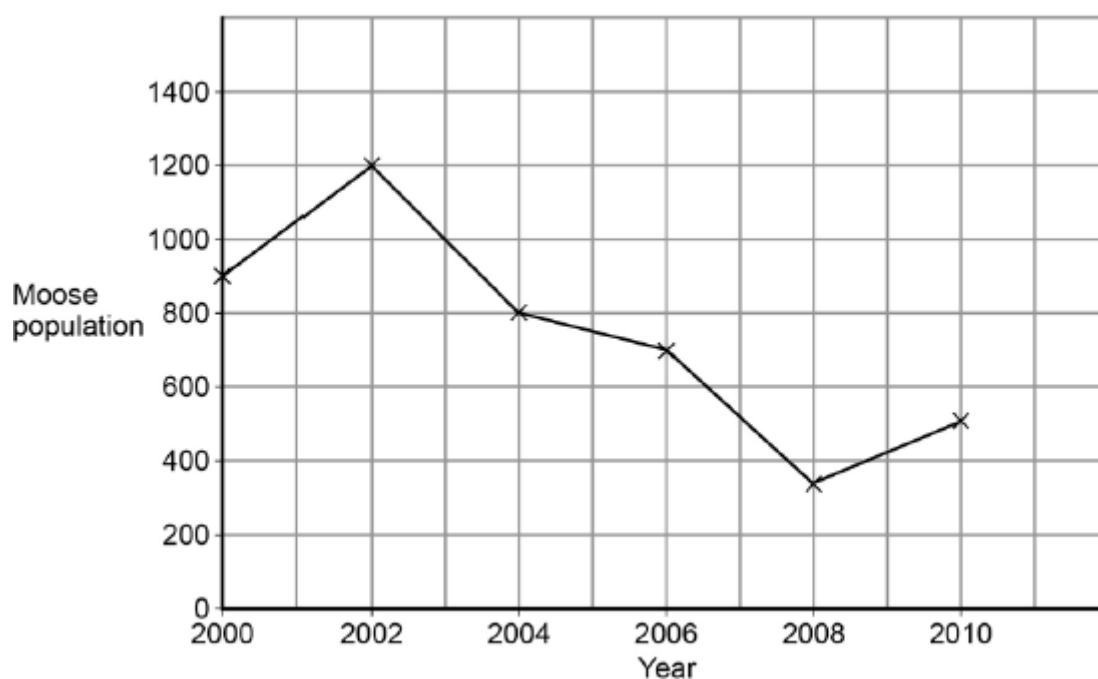
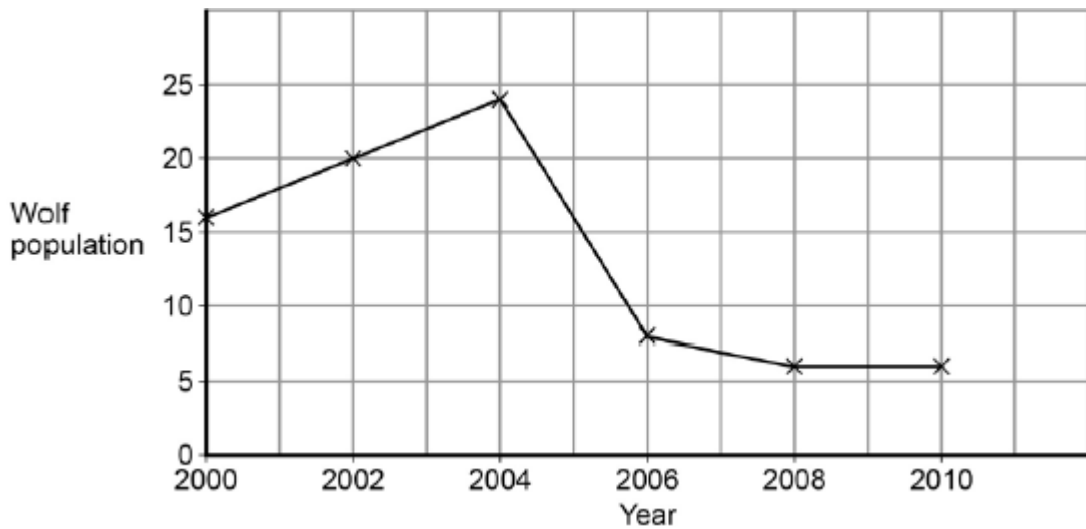


Figure 4



Look at **Figure 3**.

In this area the moose population reached its peak in 2002.

What was the size of the moose population in 2002?

.....

(1)

(d) Look at **Figure 4**.

How long after the moose population peak did the wolf population peak occur?

..... years

(1)

(e) When the moose population increases, the wolf population increases soon after.

Why does the wolf population increase?

Tick **one** box.

There is more competition for moose

☐

There is more food for wolves

☐

Other animals prey on moose

☐

There are more predators of
wolves

☐

(1)

(f) Abiotic factors and biotic factors can affect the size of the wolf population.

Which of these are **biotic** factors?

Tick **two** boxes.

Carbon dioxide levels

☐

Humans hunting

☐

Light intensity

☐

Soil type

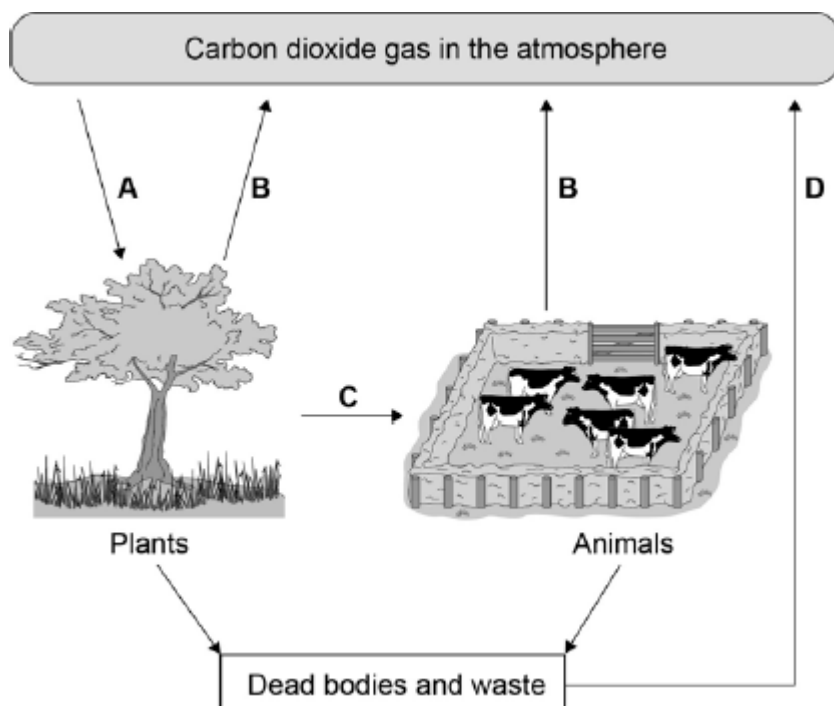
☐

Viruses

☐

(2)
(Total 7 marks)

Q2. The figure below shows the carbon cycle.



Use the information from the figure above to answer the questions.

- (a) In process **A**, carbon dioxide in the atmosphere is taken into plants.

What is process **A**?

Tick **one** box.

Evaporation

☐

Fossilisation

☐

Photosynthesis

☐

Respiration

☐

(1)

- (b) In process **B**, carbon dioxide is released from plants and animals into the atmosphere.

What is process **B**?

Tick **one** box.

Burning

☐

Feeding

☐

Photosynthesis

☐

Respiration

☐

(1)

- (c) In which process is carbon passed from one organism to another?

Tick **one** box.

A

☐

B

☐

C

☐

D

☐

(1)

- (d) What will happen to the concentration of carbon dioxide in the atmosphere if lots of trees are cut down?

.....

.....

(1)

- (e) Greenhouse gases cause global warming.

Carbon dioxide is a greenhouse gas.

Name **two** other greenhouse gases.

1

2

(2)

- (f) When living organisms die the dead material decays and is broken down.

The process of decay returns carbon dioxide to the atmosphere.

What type of organism causes decay?

.....

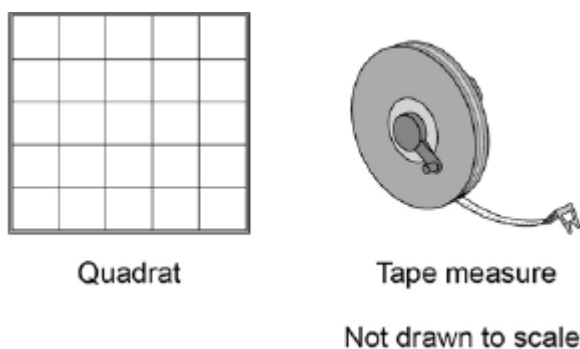
(1)

(Total 7 marks)

Q3.A student investigated the number of ribwort plants in a field.

The student used the apparatus shown in **Figure 1**.

Figure 1



This is the method used.

1. Place the quadrat in an area where there are lots of ribwort plants in the field.
 2. Count the number of ribwort plants inside a quadrat.
 3. Repeat steps 1 and 2 four more times.
- (a) How could the student improve his method so that he can collect valid results?

Tick **two** boxes.

Count the leaves of each ribwort plant

Place more quadrats in the field

Place the quadrats randomly

Use a smaller quadrat

Weigh the ribwort plants

(2)

- (b) The student calculated that the mean number of ribwort plants per m^2 was 3.2

The area of the field was 8250 m^2 .

Calculate the total number of ribwort plants in the field.

.....

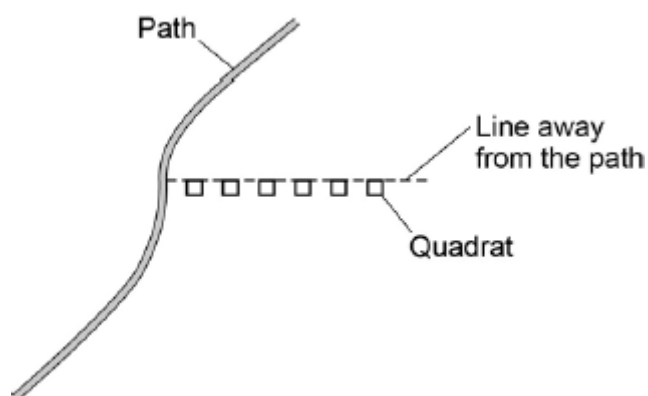
Total number of ribwort plants =

(1)

- (c) Another group of students did an investigation in the field.

Figure 2 shows how the students placed their quadrats in this investigation.

Figure 2

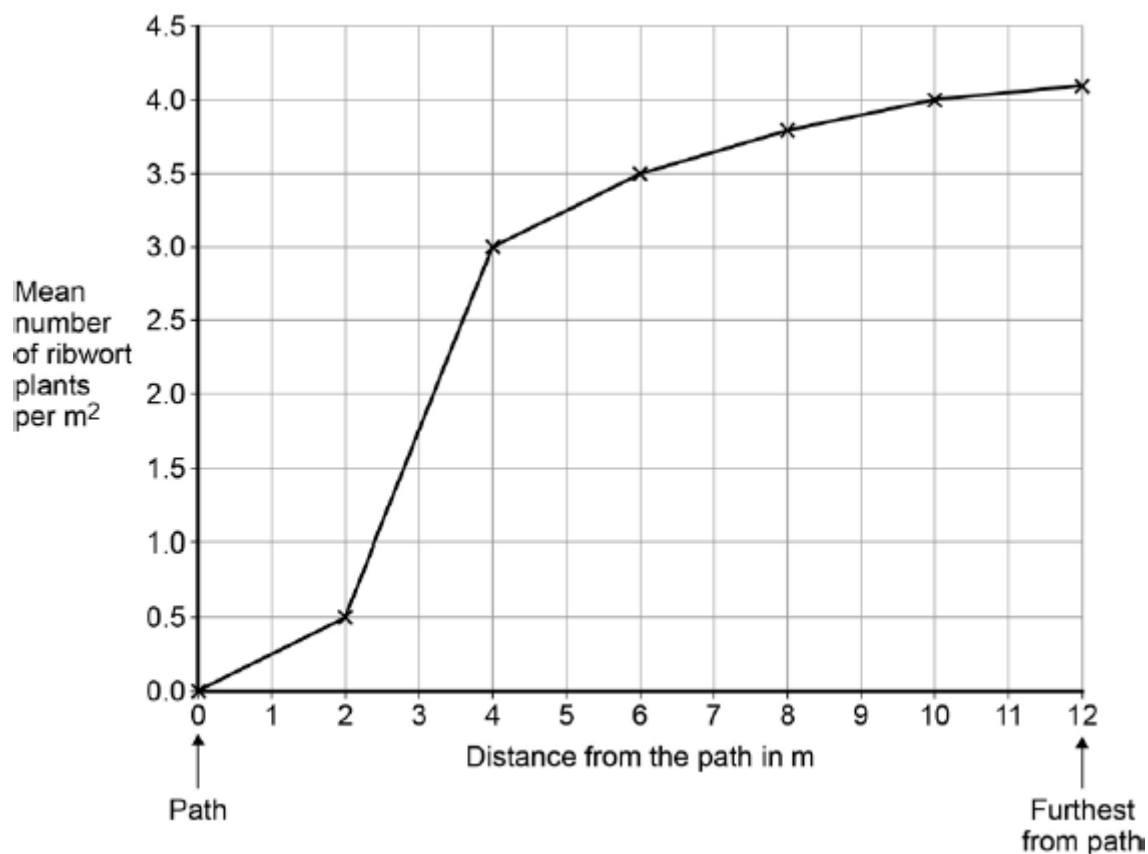


What is the name given to the line in **Figure 2**?

(1)

- (d) **Figure 3** shows the students' results.

Figure 3



Describe the relationship shown in **Figure 3**.

.....

.....

.....

.....

(2)

- (e) What is one reason why there are no ribwort plants next to the path?

Tick **one** box.

There is less light near the path

☐

The ribwort plants get walked on

☐

There are more nutrients in the soil near the path

☐

There are fewer animals near the path

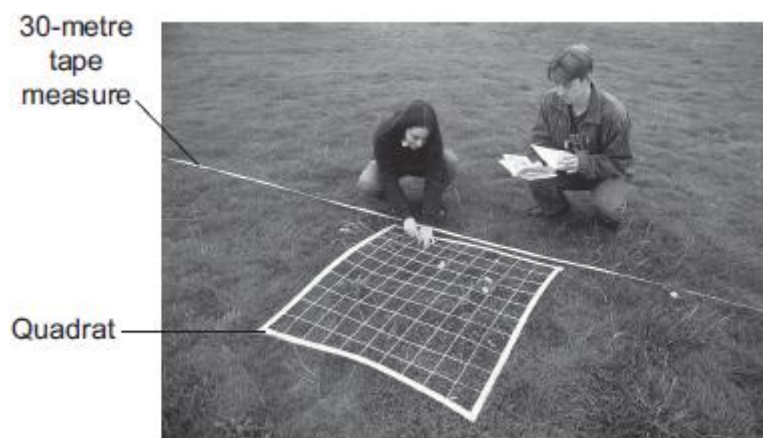
☐

(1)
(Total 7 marks)

Q4. Some students investigated the distribution of dandelion plants in a grassy field. The grassy field was between two areas of woodland.

Figure 1 shows two students recording how many dandelion plants there are in a 1 metre x 1 metre quadrat.

Figure 1



© Science Photo Library

Figure 2 shows a section across the area studied and **Figure 3** shows a bar chart of the students' results.

Figure 2

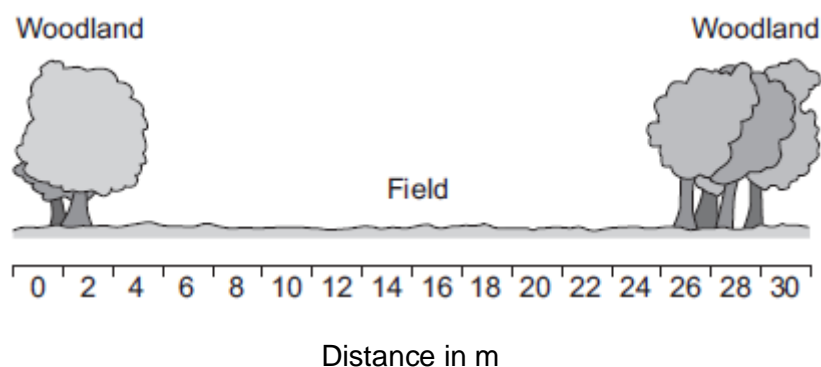
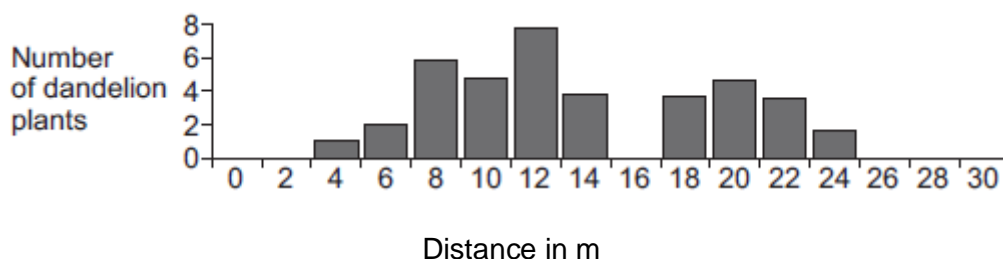


Figure 3



- (a) How did the students use the quadrat and the 30-metre tape measure to get the results in **Figure 3**?

Use information from **Figure 1**.

.....

.....

.....

.....

.....

.....

(3)

- (b) (i) Suggest **one** reason why the students found no dandelion plants under the trees.

.....

.....

(1)

- (ii) Suggest **one** reason why the students found no dandelion plants at 16 metres.

.....

.....

(1)

- (c) The teacher suggested that it was **not** possible to make a valid conclusion from these results.

Describe how the students could improve the investigation so that they could make a valid conclusion.

.....

.....

.....

.....

(2)

(Total 7 marks)

Q5. Some students wanted to find the number of thistle plants growing on a lawn.

The students placed 10 quadrats at different positions on the lawn.

Each quadrat measured 1 metre × 1 metre.

The students counted the number of thistle plants in each quadrat.

- (a) Which method should the students use to decide where to place the 10 quadrats?

Tick (✓) **one** box.

Place the quadrats as evenly as possible around the lawn.

☐

Place 5 quadrats in areas with many thistle plants and 5 quadrats in areas with only a few thistle plants.

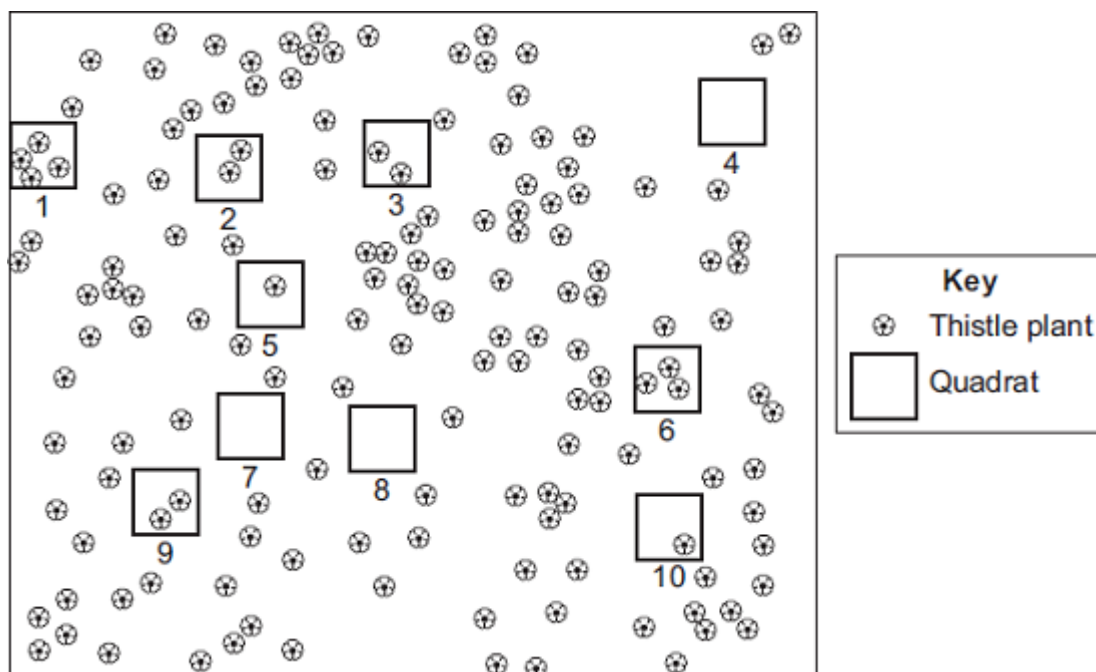
☐

Place all the quadrats randomly on the lawn.

☐

(1)

- (b) The diagram shows the lawn with the positions of the thistle plants and the students' 10 quadrats.



- (i) Complete the table to show:
- how many thistle plants the students found in each of the first four quadrats
 - the total number of thistle plants found in all 10 quadrats.

Quadrat number	Number of thistle plants in each quadrat
1	
2	
3	
4	
5	1
6	3
7	0
8	0
9	2
10	1
Total	

(2)

- (ii) Calculate the mean number of thistle plants in one quadrat.

.....

Mean =

(1)

- (iii) The lawn measured 12 metres long and 10 metres wide.

Use your answer from part (b)(ii) to estimate the number of thistle plants on the lawn.

.....

.....

Estimated number of thistle plants =

(2)

- (c) How could the students make their estimate more accurate?

.....

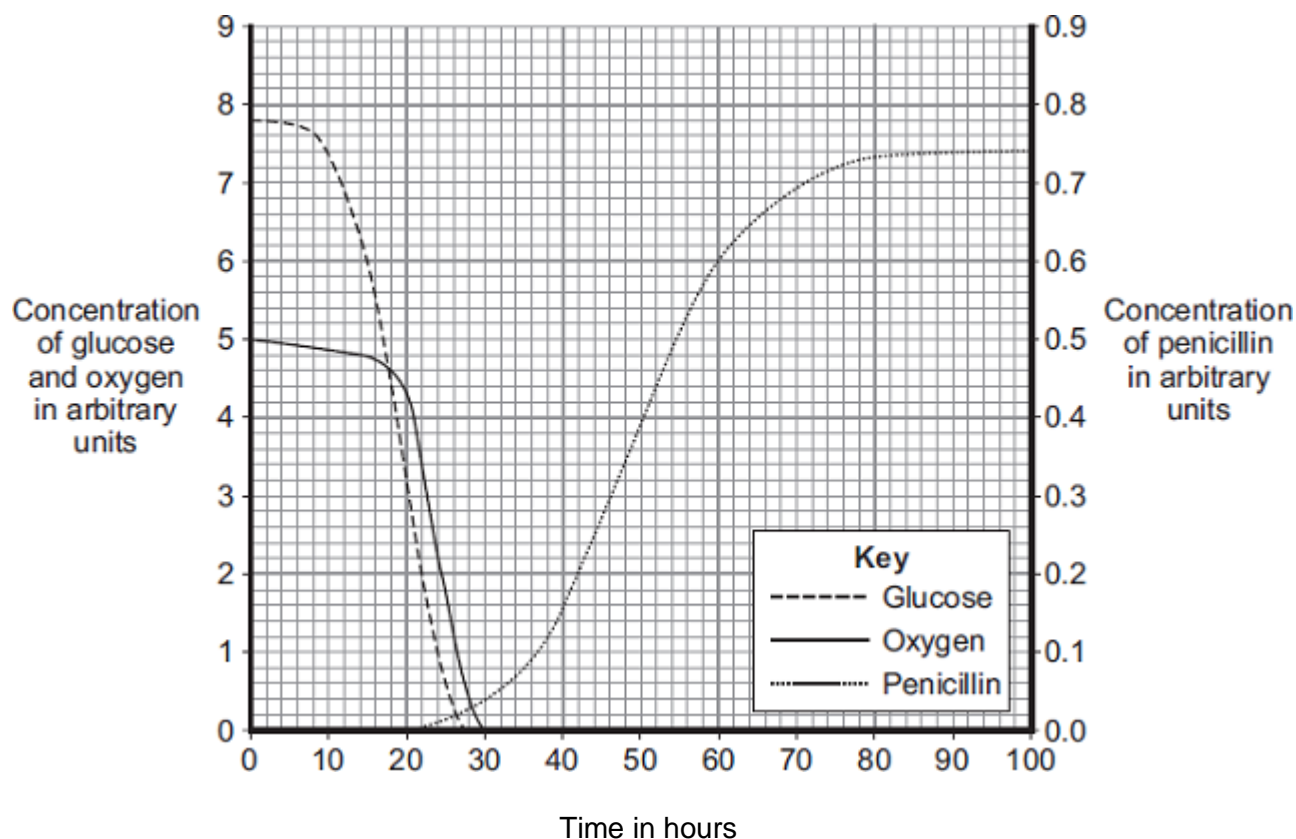
.....

(1)

(Total 7 marks)

Q6. The mould *Penicillium* can be grown in a fermenter. *Penicillium* produces the antibiotic penicillin.

The graph shows changes that occurred in a fermenter during the production of penicillin.



- (a) During which time period was penicillin produced most quickly?

Draw a ring around **one** answer.

0 – 20 hours

40 – 60 hours

80 – 100 hours

(1)

- (b) (i) Describe how the concentration of glucose in the fermenter changes between 0 and 30 hours.

.....

.....

.....

.....

(2)

- (ii) How does the change in the concentration of oxygen in the fermenter compare with the change in concentration of glucose between 0 and 30 hours?

Tick (✓) **two** boxes.

The oxygen concentration changes after the glucose concentration.

☐

The oxygen concentration changes before the glucose concentration.

☐

The oxygen concentration changes less than the glucose concentration.

☐

The oxygen concentration changes more than the glucose concentration.

☐

(2)

(iii) What is the name of the process that uses glucose?

Draw a ring around **one** answer.

distillation

filtration

respiration

(1)

(Total 6 marks)

Q7. Some students were asked to investigate the distribution of clover in a field of grass. They noticed that the clover grew in patches amongst the grass.

(a) The students decided to use quadrats.

Describe how the students should decide where to place the quadrats to investigate the distribution of the clover.

.....

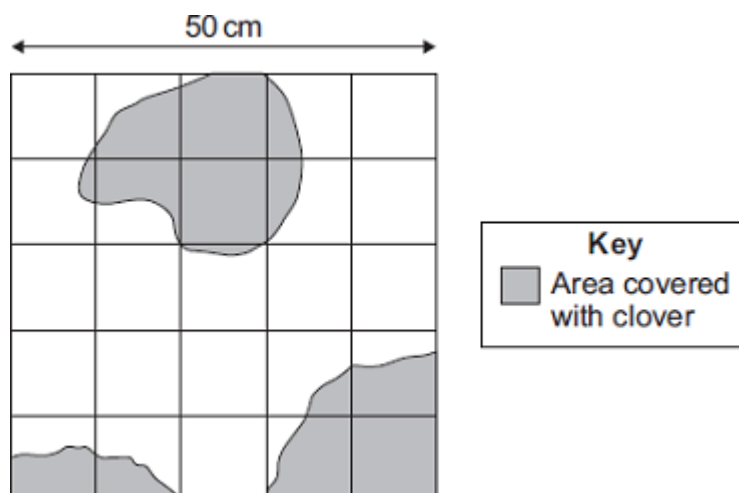
.....

.....

.....

(2)

(b) The diagram shows one of the quadrats the students used.



- (i) Estimate the number of squares of the quadrat covered with clover.

.....

Number of squares =

(1)

- (ii) Describe how you worked out your answer to part (b)(i).

.....

(1)

- (iii) Use your answer from part (b)(i) to calculate the percentage of the quadrat covered by the clover.

.....

Answer = %

(2)

- (c) Suggest **one** factor that could account for the distribution of the clover plants.

(1)
(Total 7 marks)

Q8. In a woodland, bluebells grow well every year.

Bluebells growing well in woodland



Mick Garratt [CC-BY-SA-2.0], via Wikimedia Commons

Each year the dead flowers and leaves of the bluebells and leaves from the trees fall onto the ground.

The bluebells do not run out of mineral ions.

Explain why the bluebells do **not** run out of mineral ions.

The words in the box may help you.

roots	dead leaves	mineral ions
	microorganisms	decay

.....

.....

.....

.....

.....

.....

(3)
(Total 3 marks)

Q9. The amount of carbon dioxide in the atmosphere is increasing.

The table shows the estimated mass of carbon dioxide exchanged with the atmosphere in one year.

	Mass of carbon dioxide exchanged with the atmosphere in millions of tonnes	
	Passed out into the atmosphere	Taken in from the atmosphere
Plants	30	64
Animals	10	0
Microorganisms	24	0
Combustion	6	0

- (a) (i) Calculate the total mass of carbon dioxide passed out into the atmosphere in one year.

Show clearly how you work out your answer.

.....
.....

Answer million tonnes

(2)

- (ii) Calculate the increase in the mass of carbon dioxide in the atmosphere in one year.

You should use your answer to part (a)(i) in your calculation.

Show clearly how you work out your answer.

.....

.....
Answer million tonnes

(2)

- (b) Draw a ring around the correct answer to complete the sentence.

Plants use carbon dioxide in the process of

decomposition.
photosynthesis.
respiration.

(1)
(Total 5 marks)