PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



EXAM QUESTION PACK

TOPIC 9: ECOSYSTEMS AND MATERIAL CYCLES (PACK 3)

SCORE	PERCENTAGE
/68	%

STEMUP

These questions belong to Pearson Edexcel, not to us.

The examination questions, mark schemes and examiner comments in this pack were written and published by Pearson Edexcel. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with Pearson Edexcel and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. Pearson Edexcel has not endorsed, approved or been involved in the production of it. Pearson Edexcel and the qualification titles used here belong to their respective owners and appear for identification only.

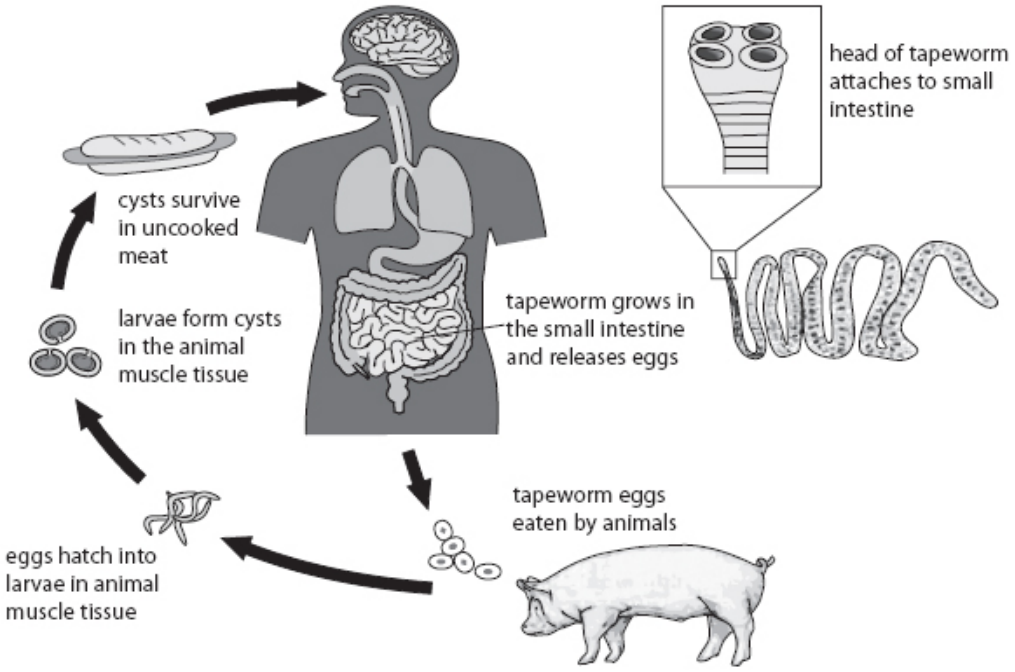
Where to find the originals

Pearson Edexcel publishes its past papers, mark schemes and examiner reports. Always check the current specification at qualifications.pearson.com before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

Q1.

(a) The diagram shows the life cycle of the human tapeworm.



(i) The tapeworm absorbs food in the human intestine.

Complete the sentence by putting a cross (☒) in the box next to your answer.

A tapeworm is an example of a

(1)

☒ **A** living indicator

☒ **B** mutualist

☒ **C** parasite

☒ **D** producer

(ii) Use information in the diagram to describe how an adaptation of the tapeworm enables it to live in the human intestine.

(2)

.....

.....

.....

.....

(iii) Using information in the diagram, suggest how humans could avoid becoming infected with tapeworms.

(2)

.....

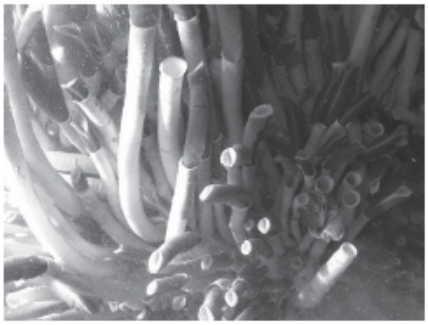
.....

.....

.....

(b) The photograph shows another type of worm.

These are tube worms that live near hydrothermal vents.



Explain the relationship between these tube worms and chemosynthetic bacteria.

(3)

.....

.....

.....

.....

.....

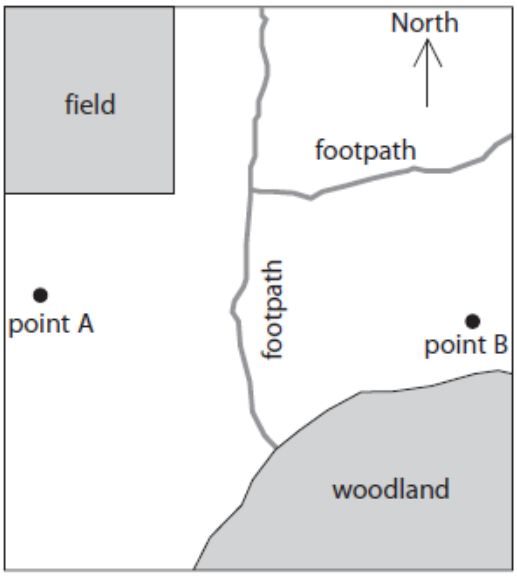
.....

(Total for Question = 8 marks)

Q2.

A student investigated the distribution of poppy plants in a park.

Figure 2 shows a sketch of the park and a diagram of a poppy plant.



© Creative Commons License


poppy plant

Figure 2

The student placed a 1 m^2 quadrat at 10 metre intervals between point A and point B and recorded the number of poppy plants in each quadrat.

The woodland is a protected conservation area.

Explain why this woodland increases the biodiversity of the park.

(2)

.....

.....

.....

.....

(Total for question = 2 marks)

Q3.

Tuna are carnivorous fish.

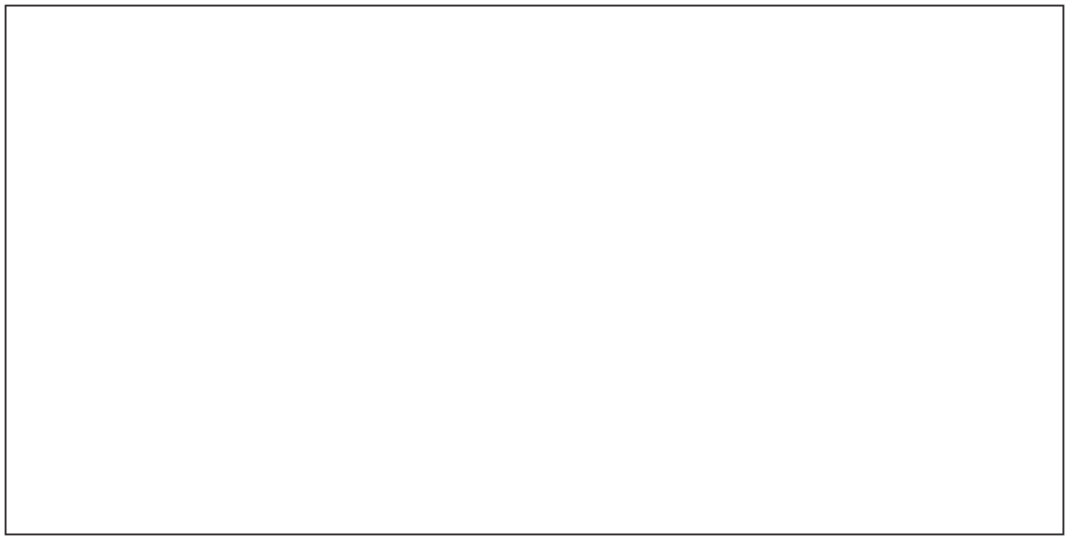
In the wild, tuna eat smaller fish called mackerel.

Mackerel eat sand eels.

Sand eels eat microscopic plant life called phytoplankton.

Sketch a pyramid of biomass for this food chain and label each level with the name of the organism.

(2)



(Total for question = 2 marks)

Q4.

Climacteric fruits are fruits that can ripen after they have been removed from the plant.

Explain why temperature affects the rate of decomposition.

(2)

.....

.....

.....

.....

(Total for question = 2 marks)

Q5.

Genetic engineering can be used to produce plants that are resistant to herbicide.

One herbicide works by preventing the activity of an enzyme.

Some bacteria have a form of this enzyme that is not affected by the herbicide.

The table shows the number of species of weeds resistant to this herbicide from 1996 to 2004.

	Year				
	1996	**1998**	**2000**	**2002**	**2004**
Number of species of weeds resistant to this herbicide	1	2	3	5	8

(i) Describe the trend shown in the data.

(1)

.....

.....

(ii) Suggest reasons for this trend.

(2)

.....

.....

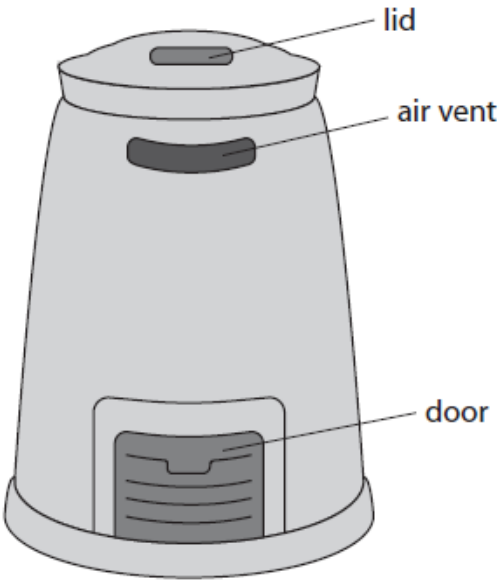
.....

.....

Q6.

A gardener read information on a gardening society website about how to use a compost bin.

Figure 11 shows the compost bin and some of the instructions.



- add soil in between layers of vegetation
- mix the contents of the compost bin once a month to add air
- keep the lid on to prevent water entering

Figure 11

(i) Give **one** reason why the gardener thought the gardening society website was a good source of information.

(1)

.....

.....

(ii) Give reasons why soil is added to the compost bin and why the contents are turned to add air.

(2)

.....

.....

.....

.....

.....

.....

(iii) The gardener noticed the compost bin became warm a few days after vegetation was added.

Why did the contents of the compost bin become warm?

(1)

☒ **A** respiration occurred and this is an endothermic reaction

☒ **B** respiration occurred and this is an exothermic reaction

☒ **C** photosynthesis occurred and this is an endothermic reaction

☒ **D** photosynthesis occurred and this is an exothermic reaction

(iv) The mass of the contents of the compost bin at the start was 40 kg.

After 60 days the mass of the contents was 32 kg.

Which is the rate of decay?

(1)

☒ **A** 1.8 kg per day

☒ **B** 0.66 kg per day

☒ **C** 0.53 kg per day

☒ **D** 0.13 kg per day

(Total for question = 5 marks)

Q7.

Genetic engineering can be used to produce plants that are resistant to herbicide.

One herbicide works by preventing the activity of an enzyme.

Some bacteria have a form of this enzyme that is not affected by the herbicide.

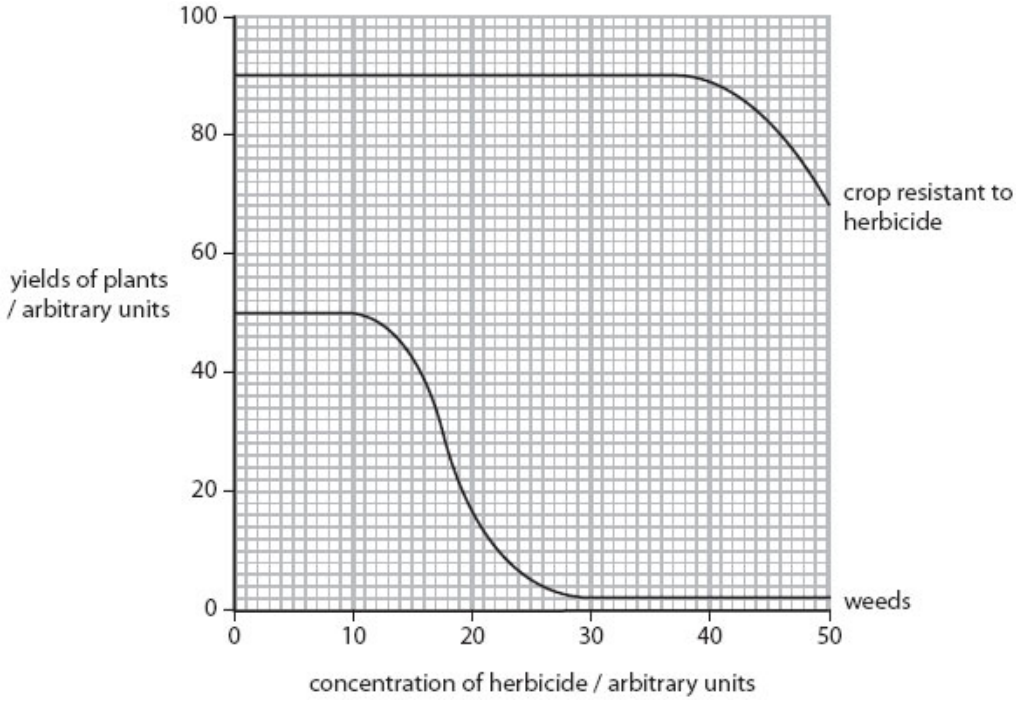
Fields of crops have weeds growing in them.

In an investigation, crops resistant to a herbicide were grown in different fields.

The crops were sprayed with different concentrations of the herbicide.

The mass of the crops and weeds were recorded.

The graph shows the results of this investigation.



(i) Describe the effects of the herbicide on the yield of weeds.

(2)

.....

.....

.....

.....

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The most appropriate concentration of herbicide to use is

(1)

☒ **A** 10 arbitrary units

☒ **B** 30 arbitrary units

☒ **C** 40 arbitrary units

☒ **D** 50 arbitrary units

Q8.

Tuna are carnivorous fish.

In the wild, tuna eat smaller fish called mackerel.

Some young tuna are kept in fish farms.

The tuna in fish farms are fed more food than they would normally catch in the wild, so they grow quickly.

When a tuna reaches 35 kg it is removed from the fish farm and sold as food.

Figure 5 shows the effect of feeding tuna different protein diets.

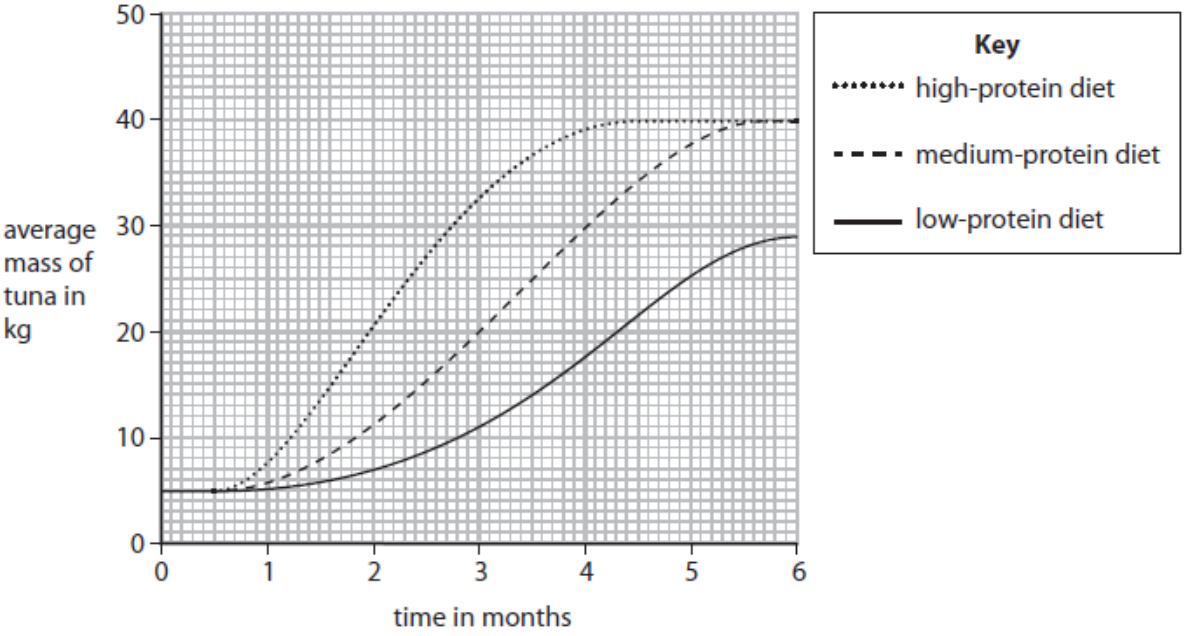


Figure 5

State and explain which diet would be given to the tuna so they can be sold in the shortest possible time.

(4)

.....

.....

.....

.....

.....

.....

.....

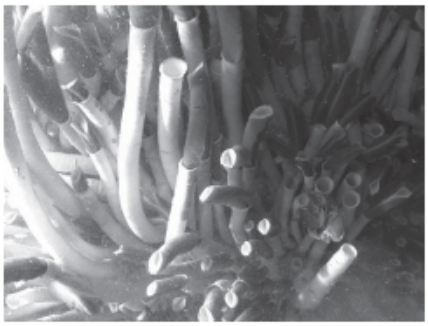
.....

(Total for question = 4 marks)

Q9.

The photograph shows another type of worm.

These are tube worms that live near hydrothermal vents.



Explain the relationship between these tube worms and chemosynthetic bacteria.

(3)

.....

.....

.....

.....

.....

.....

Q10.

Figure 9 shows part of the nitrogen cycle.

dead animals and plants $\xrightarrow{X}$ ammonia $\xrightarrow{Y}$ nitrates

Figure 9

(i) Identify the types of microorganism involved in process X and process Y.

(2)

X .....

Y .....

(ii) Explain how crop rotation increases nitrate levels in the soil.

(3)

.....

.....

.....

.....

.....

.....

(iii) Explain why increased nitrate levels in the soil improve crop yield.

(2)

.....

.....

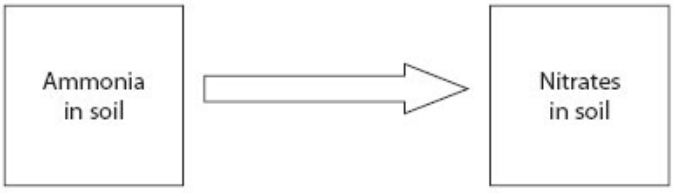
.....

.....

(Total for question = 7 marks)

Q11.

The diagram shows one of the stages of the nitrogen cycle.



(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The name of this stage is

(1)

☒ **A** decomposition

☒ **B** denitrification

☒ **C** nitrification

☒ **D** nitrogen fixation

(ii) Explain how plants use the nitrates from the soil.

(2)

.....

.....

.....

.....

(iii) Describe how the over-use of nitrate fertilisers can cause eutrophication.

(4)

.....

.....

.....

.....

.....

.....

.....

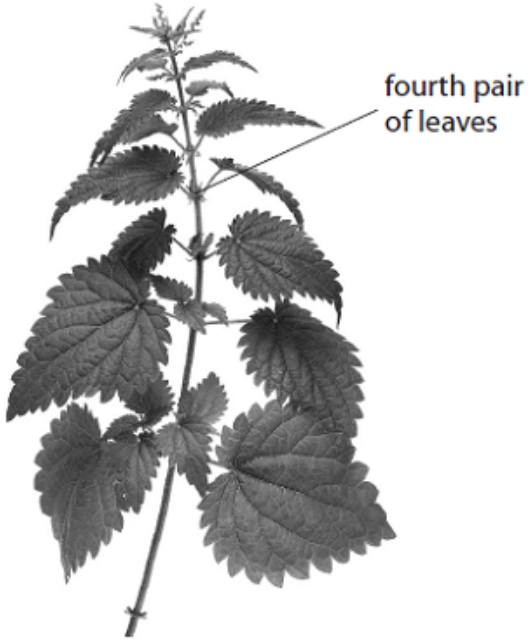
.....

Q12.

A student investigated the width of leaves on nettle plants growing in two areas next to a woodland.

Figure 5a shows a nettle plant and Figure 5b shows a map of the woodland showing area A and area B.

The woodland caused area A to be in the shade.



(Source: © Alila Medical Media/Shutterstock)

Figure 5a

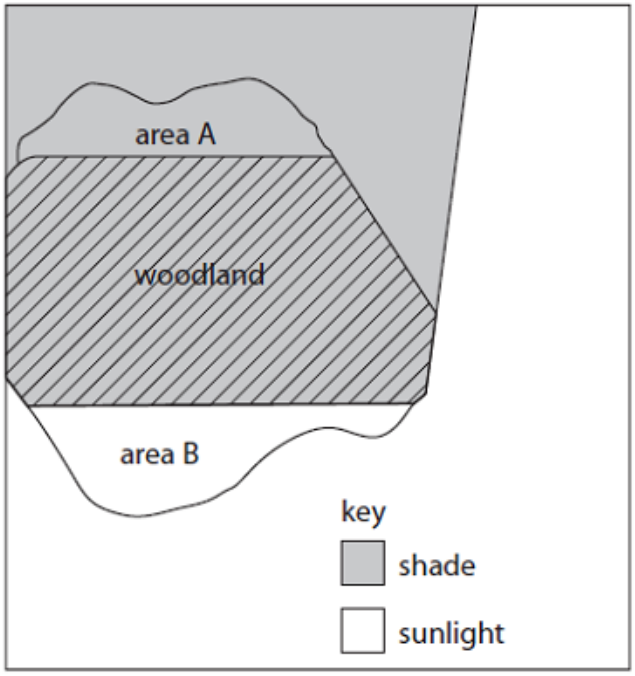


Figure 5b

The student also studied some of the animals in areas A and B.

The student saw caterpillars eating the leaves of some nettles.

The student also saw a toad eating a large beetle.

Large beetles eat ladybirds.

Ladybirds eat caterpillars.

(i) Give the food chain for these feeding relationships.

(3)

(ii) Frogs also eat large beetles.

Figure 7 shows the energy transferred between these animals.

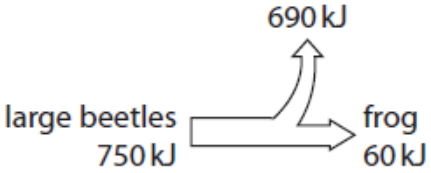


Figure 7

Calculate the percentage efficiency of energy transfer from the large beetles to the frog.

(2)

..... %

(iii) Give **two** reasons why only some of the energy in the biomass of the large beetles is transferred

to the biomass of the frog.

(2)

1 .....

.....

2 .....

.....

(Total for question = 7 marks)

Q13.

A student investigated the distribution of poppy plants in a park.

Figure 2 shows a sketch of the park and a diagram of a poppy plant.

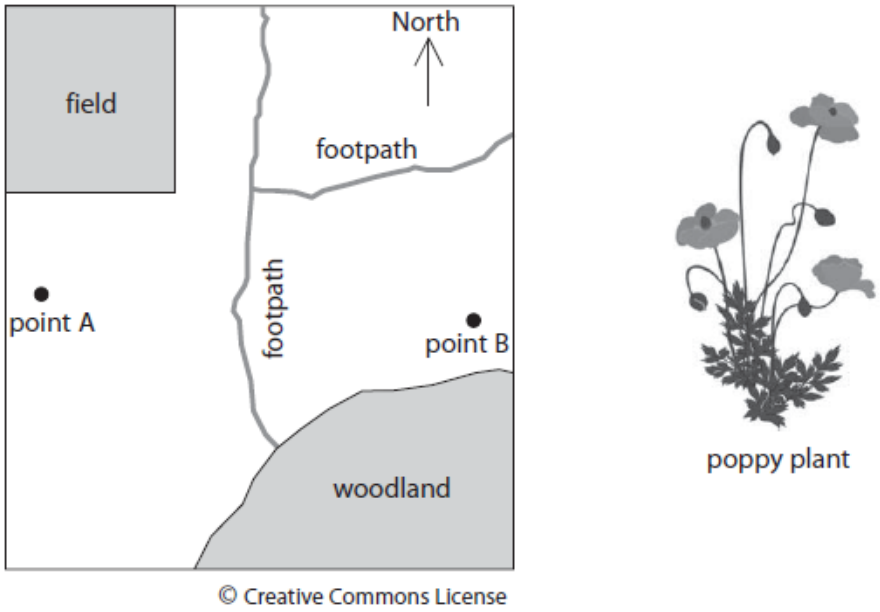


Figure 2

The student placed a 1 m^2 quadrat at 10 metre intervals between point A and point B and recorded the number of poppy plants in each quadrat.

(i) Name the technique the student used to study the distribution of poppy plants.

(1)

.....

Figure 3 shows the number of poppy plants at 10 metre intervals from point A to point B.

distance from point A in metres	number of poppy plants in the 1 m^2 quadrat
0 (point A)	12
10	10
20	11
30	8
40 (point B)	6

Figure 3

(ii) Explain the effect of the woodland on the distribution of poppy plants.

(3)

.....

.....

.....

.....

.....

.....

.....

(iii) Devise a plan, that uses a quadrat, to estimate the number of poppy plants in the field.

(3)

.....

.....

.....

.....

.....

.....

.....

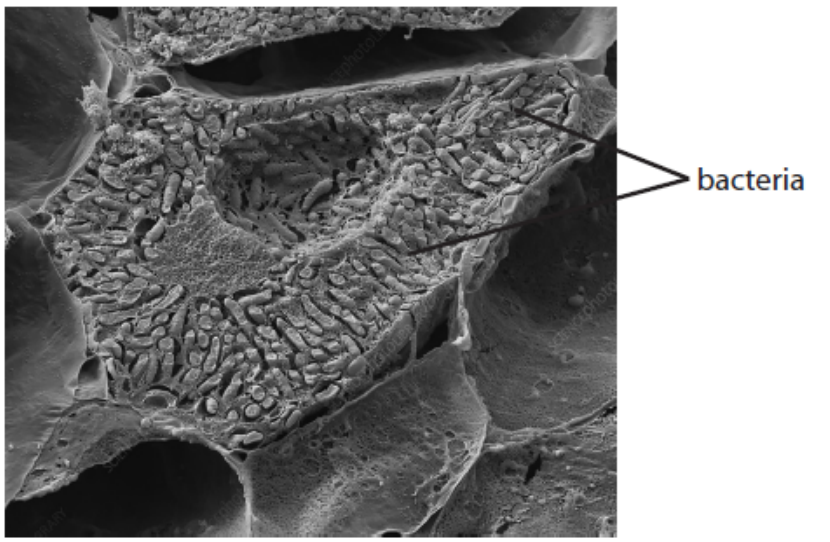
(Total for question = 7 marks)

Q14.

Figure 8 shows a cross-section of a root nodule on a leguminous plant.

Bacteria in the root nodule provide the leguminous plant with nitrogen compounds.

The leguminous plant provides the bacteria with sugars.



(Source: © Nigel Downer / Science Photo Library)

Figure 8

(i) Which term describes the relationship between this leguminous plant and the bacteria?

(1)

☒ **A** parasitism

☒ **B** indigenous

☒ **C** biodiversity

☒ **D** mutualism

(ii) The width of this root nodule is 7.5 mm.

Give the width in µm.

(1)

..... µm

(Total for question = 2 marks)

Q15.

Joseph Priestley was a scientist who investigated how green plants and combustion affected the carbon cycle.

Figure 13 shows his first experiment.

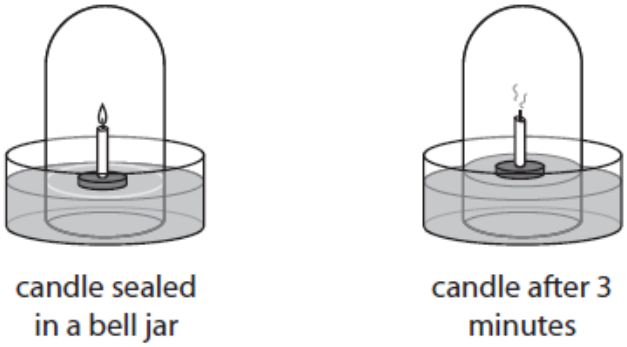


Figure 13

(i) State why the candle was not burning after three minutes.

(1)

.....

.....

(ii) Joseph Priestley continued the investigation but placed a plant inside the bell jar as shown in Figure 14.



Figure 14

He observed that the candle stayed alight for two minutes more than the candle in the bell jar in the first experiment.

Explain his observation.

(2)

.....

.....

.....

.....

(iii) State **two** variables that would need to be controlled to compare these two experiments.

(2)

1 .....

.....

2 .....

.....

(Total for question = 5 marks)

Q16.

The student collected and weighed some fresh leaves from a beech tree.

- The leaves were placed on top of soil in a tray.
- This was repeated for leaves from three other types of tree.
- The trays were kept in the same abiotic conditions for 40 days.
- The leaves were reweighed after 40 days.

(i) State **two** abiotic factors that should be kept the same in this investigation.

(2)

1 .....

2 .....

(ii) Explain how this investigation could be improved to make the results more comparable.

(2)

.....

.....

.....

.....

(Total for question = 4 marks)

Q17.

* Explain how an increase in the production of pollutants can be due to an increase in human population.

Include both air and water pollution in your answer.

(6)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Q18.

Water pollution can be caused by an increase in nitrates and phosphates.

Explain the problems associated with an increase of nitrates and phosphates levels in a lake.

(3)

.....

.....

.....

.....

.....

.....

.....

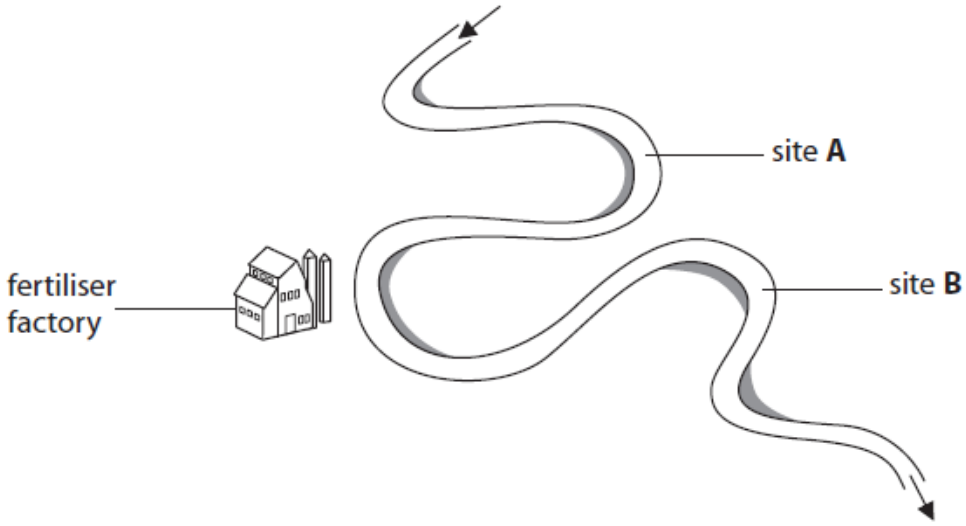
.....

Q19.

Pollution

The diagram shows a river and the location of a fertiliser factory.

The arrows indicate the direction of the flow of the river.



A scientist recorded the nitrate concentrations of the water at site **A** and site **B**.

Her results are shown in the table.

site	nitrate concentration / mg per dm^3			
	sample 1	sample 2	sample 3	mean
A	17	25	18	20
B	49	64	58	

(a) (i) Calculate the mean nitrate concentration found at site **B**.

(2)

answer = ... mg per dm^3

(ii) The scientist observed algae and some dead fish in the river at site **B**.

These were not present at site **A**.

Give an explanation for these observations.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

*(b) Scientists observe living organisms in an environment to assess the level of pollution.

Describe how the level of water pollution and air pollution can be assessed using living organisms.

(6)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for question = 12 marks)

Q20.

Plants cannot use nitrogen directly from the air but need it to make proteins.

Explain how plants get the nitrogen they need to make protein.

(3)

.....

.....

.....

.....

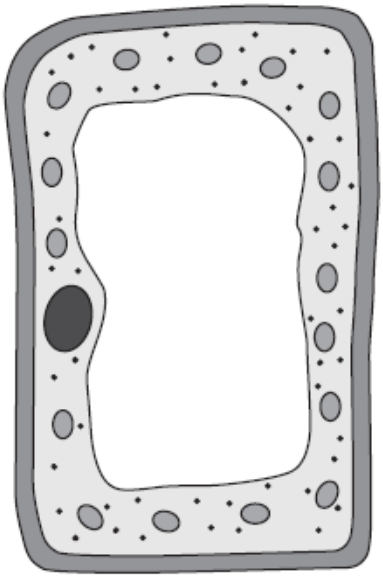
.....

.....

Q21.

Photosynthesis

The diagram shows a plant cell.



(a) Complete the sentence by putting a cross (☒) in the box next to your answer.

This plant cell is a

(1)

☒ **A** xylem vessel

☒ **B** phloem vessel

☒ **C** root hair cell

☒ **D** leaf palisade cell

(b) Explain how water moves from cell to cell in a leaf.

(2)

.....

.....

.....

.....

(c) Some small plants can grow on the bark of trees.

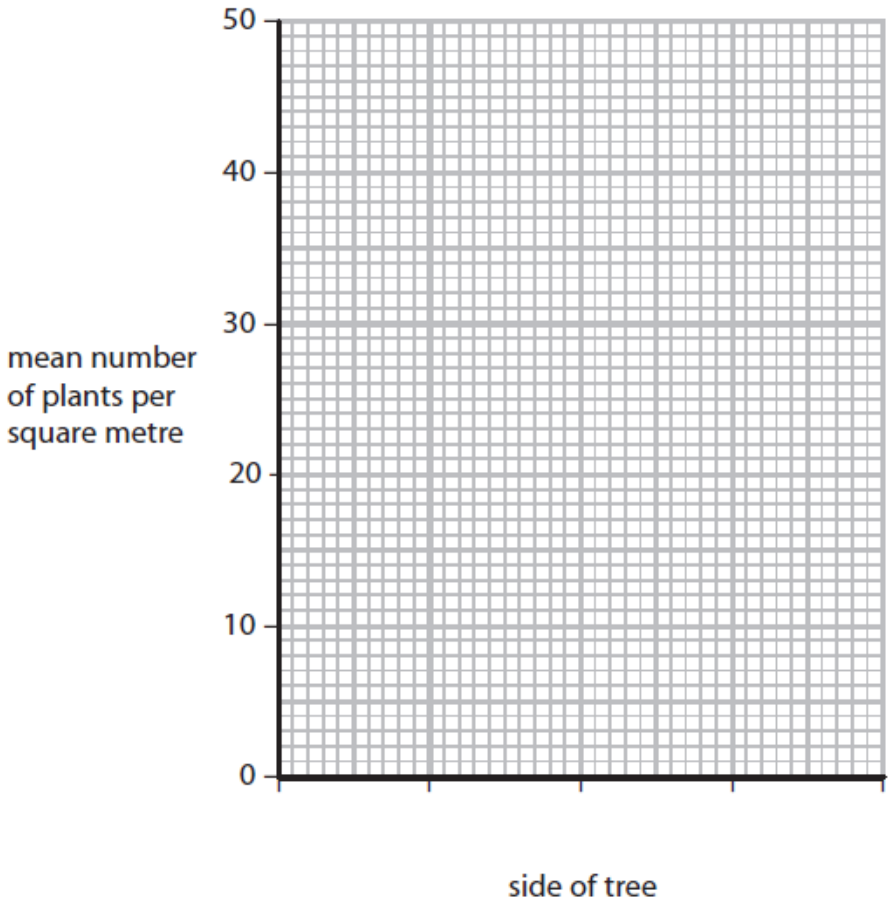
The distribution of two plant species, species A and species B, growing on the north and south side of a tree was investigated.

The results are shown in the table.

	mean number of plants per square metre	
side of tree	species A	species B
North	48	12
South	0	36

(i) Draw a bar chart to illustrate the data in this table.

(2)



(ii) Which piece of equipment would be used to measure the distribution of plants on the bark of the tree?

Place a cross (☒) in the box next to your answer.

(1)

☒ **A** a pooter

☒ **B** a sweep net

☒ **C** a pitfall trap

☒ **D** a quadrat

(iii) Suggest reasons for the distribution of species B on the north and south sides of the tree.

(2)

.....

.....

.....

.....

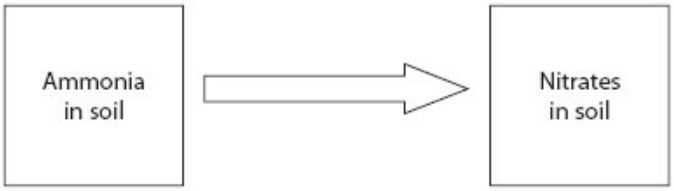
.....

.....

(Total for question = 8 marks)

Q22.

The diagram shows one of the stages of the nitrogen cycle.



(a) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The name of this stage is

(1)

- ☒ **A** decomposition
- ☒ **B** denitrification
- ☒ **C** nitrification
- ☒ **D** nitrogen fixation

(ii) Explain how plants use the nitrates from the soil.

(2)

.....

.....

.....

.....

(iii) Describe how the over-use of nitrate fertilisers can cause eutrophication.

(4)

.....

.....

.....

.....

.....

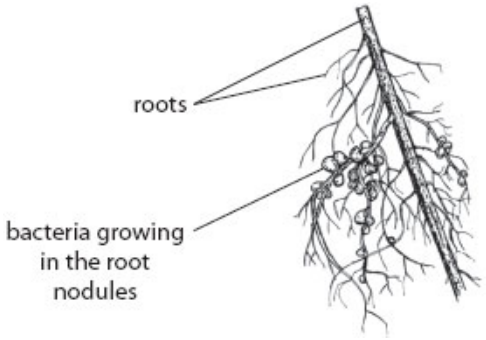
.....

.....

.....

(b) Leguminous plants such as beans and peas have bacteria growing inside nodules on their roots.

The diagram shows some nodules on a root.



Explain the relationship between this bean plant and the bacteria growing in the root nodules.

(3)

.....

.....

.....

.....

.....

.....

(Total for Question is 10 marks)

Q23.

Figure 2 shows an area of woodland with some small plants growing in the ground between the trees.



(Source: © Maksym Holovinov/Shutterstock)

Figure 2

Name a group of organisms that break down the dead leaves and release mineral ions into the soil.

(1)

.....

(Total for question = 1 mark)

Q24.

The photographs show three species of lichen.

Each species can tolerate different concentrations of pollutants present in the air.



(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

Lichens are examples of

(1)

- ☒ **A** living indicators
- ☒ **B** pathogens
- ☒ **C** pollutants
- ☒ **D** vectors

(ii) Explain which one of these species is most likely to be found near a coal-burning power station.

(2)

.....

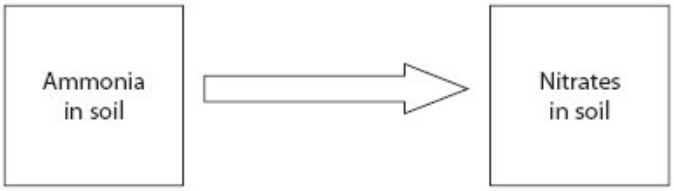
.....

.....

.....

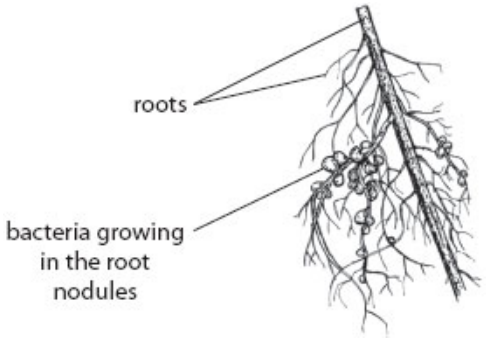
Q25.

The diagram shows one of the stages of the nitrogen cycle.



Leguminous plants such as beans and peas have bacteria growing inside nodules on their roots.

The diagram shows some nodules on a root.



Explain the relationship between this bean plant and the bacteria growing in the root nodules.

(3)

.....

.....

.....

.....

.....

.....

the meat(1)