AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



EXAM QUESTION PACK

4.7.2 ORGANISATION OF AN ECOSYSTEM (PACK 5)

SCORE	PERCENTAGE
/234	%

STEMUP

These questions belong to AQA, not to us.

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

What we do not own

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

Where to find the originals

AQA publishes its past papers, mark schemes and examiner reports. Always check the current specification at aqa.org.uk 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 class of eight students measured the population of water fleas living at the edge of a large pond.

This is the method each student used.

1. Put some pond water in a white tray.
2. Take a pond net and scoop at the edge of the pond a few times.
3. Empty the pond net into the water in the tray.
4. Count the number of water fleas in the tray.

The photograph below shows a student working.



(a) The students did **not** control some variables.

Give **two** variables the students should have controlled to make this a valid method.

1. _____

_____

2. _____

_____

(2)

The eight students then used a different method to obtain valid results.

Table 1 shows their results.

Table 1

Student	**Number of water fleas per 1000 cm^3 pond water**
A	66

STEMUP.CO.UK

B	37
C	51
D	102
E	40
F	122
G	75
H	19

(b) Calculate the students' mean value for the population of water fleas at the edge of the pond.

_____

_____

Mean population = _____ water fleas per 1000 cm^3 pond water

(1)

(c) What was the range of the students' results?

Range = _____

(1)

(d) Suggest **one** reason why such a wide range of results was found.

_____

_____

(1)

(e) The teacher then sampled the centre of the pond eight times.

His mean value was 12 water fleas per 1000 cm^3 pond water.

What conclusion can you make about the distribution of water fleas in the pond?

Use the students' mean value from part **(b)** to compare with the teacher's mean value.

_____

_____

(1)

Scientists counted some different invertebrates living in a pond in 2014 and in 2016

Table 2 shows the results.

Table 2

Invertebrate	**Number of invertebrates**

STEMUP.CO.UK

species	2014	2016
Bloodworms	13	48
Freshwater shrimps	24	9
Mayfly nymphs	32	0
Water snails	19	24

(f) Calculate the change in the number of bloodworms between 2014 and 2016

_____

Change = _____ bloodworms

(1)

(g) Calculate the number of shrimps in the pond in 2016 as a percentage of the number of shrimps in the pond in 2014

_____

Percentage = _____ %

(1)

(h) Invertebrate species found in a pond can be used as an indicator of the pollution level.

Table 3 shows which species can survive in different levels of pollution.

Table 3

Invertebrate species	Pollution level		
	Low	Medium	High
Bloodworms	✓	✓	✓
Freshwater shrimps	✓	✓	✗
Mayfly nymphs	✓	✗	✗
Water snails	✓	✓	✓

Key
✓ = Can survive
✗ = Cannot survive

What conclusion can you make about the change in the level of pollution in the pond between 2014 and 2016?

Give **one** reason for your conclusion.

Use the data in **Table 2** and **Table 3**

_____

STEMUP.CO.UK

_____

_____

_____

(2)

(i) Water pollution and global warming are two problems that have been caused by the rapid increase of the human population.

Suggest **two** other problems caused by the rapid increase of the human population.

1. _____

_____

2. _____

_____

(2)

(Total 12 marks)

Q2.

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

(a) Are the factors in **Table 1** biotic or abiotic?

Tick **one** box for each factor.

Table 1

Factor	Biotic	Abiotic
Diseases		
Herbivores		
Temperature		
Water		

(2)

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.'

(b) Explain why the students thought their hypothesis would be correct.

_____

_____

STEMUP.CO.UK

_____

_____

_____

_____

_____

_____

(3)

(c) The students used two pieces of equipment.

Give the scientific name of each piece of equipment.

A square frame measuring 0.5 m × 0.5 m _____

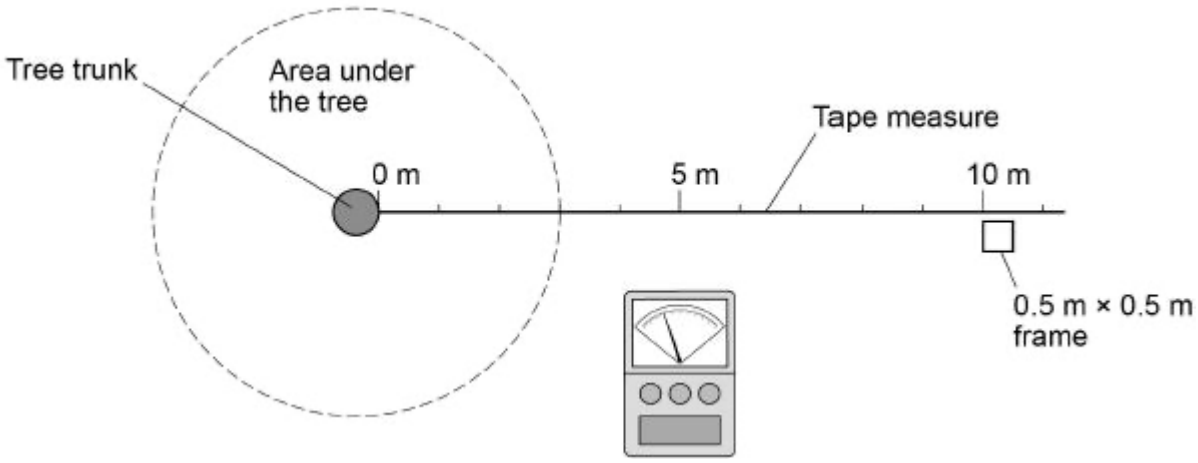
An electronic device to measure light intensity _____

(2)

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./p>
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.

The diagram below shows the equipment in this investigation.



(d) Calculate the total area sampled.

_____

_____

Total area sampled = _____ m^2

STEMUP.CO.UK

(1)

(e) The whole investigation was done as quickly as possible on the same day.

Suggest **one** reason why.

_____

_____

(1)

(f) Give **one** way the investigation could be improved.

_____

_____

(1)

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

(g) Which plant species in **Table 2** will only grow at high light intensity?

_____

(1)

(h) 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)

STEMUP.CO.UK

(i) 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.

Factor _____

Reason _____

_____

(2)

(Total 15 marks)

Q3.

Many people eat shellfish called oysters.

An oyster has 20 chromosomes in each body cell.

(a) Which arrangement of chromosomes will a male oyster have in each body cell?

Tick **one** box.

One X and one Y chromosome and 8 pairs of other chromosomes	☐
Two X and two Y chromosomes and 8 pairs of other chromosomes	☐
One X and one Y chromosome and 9 pairs of other chromosomes	☐
Two X chromosomes and 9 pairs of other chromosomes	☐

(1)

(b) Oyster gametes only contain half the amount of DNA compared to a normal oyster body cell.

Describe the type of cell division that produces gametes.

_____

_____

_____

_____

_____

_____

(3)

Biologists have discovered a way to produce oysters that have three sets of

STEMUP.CO.UK

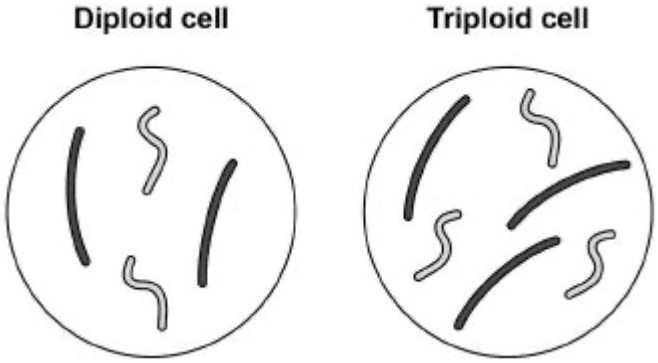
chromosomes (triploid) instead of the usual two sets (diploid).

The triploid oysters cannot reproduce and so they grow more quickly.

Diploid oysters do not taste good in the reproductive season. Triploid oysters taste good all year.

The diagram below shows the chromosomes in a diploid cell and in a triploid cell.

Only two sets of chromosomes are shown.



(c) Suggest why the triploid oysters are **not** able to reproduce.

_____

_____

_____

(1)

(d) Explain why the triploid oysters grow more quickly than the diploid oysters.

_____

_____

_____

_____

_____

_____

(2)

(e) The population of diploid oysters growing in the wild has reduced by over 80% in the last 20 years.

Suggest **two** environmental factors which may be causing this reduction.

Give a reason why each factor may be causing the reduction in the population.

1. _____

_____

STEMUP.CO.UK

2. _____

_____

(2)

(f) Oyster farmers grow the triploid oysters from young seed oysters.

The production of seed oysters involves the use of a chemical called cytochalasin B. Cytochalasin B has been shown to cause cancer in mice.

Evaluate the production of triploid oysters for supermarkets and restaurants.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

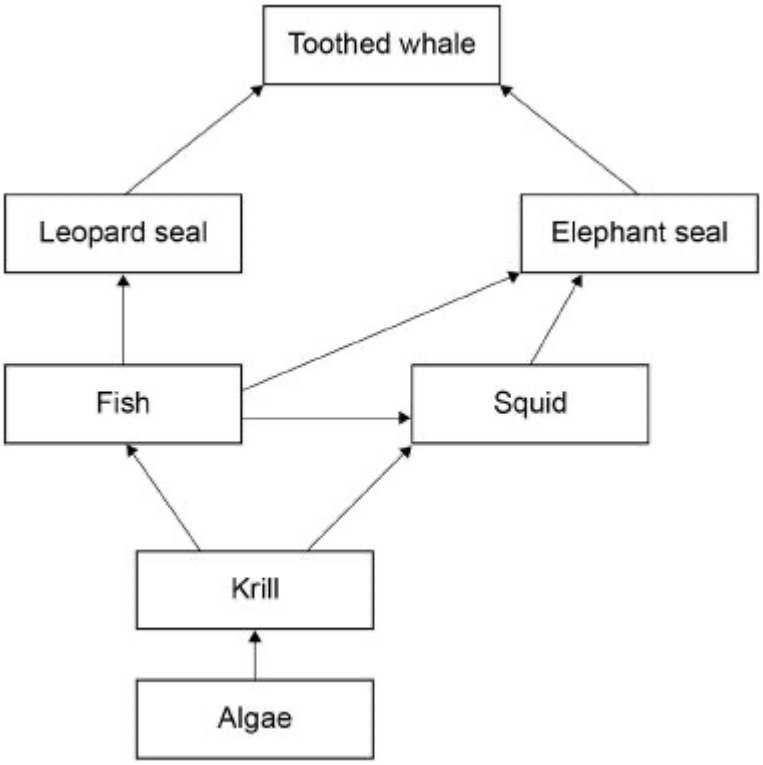
(6)

(Total 15 marks)

Q4.

The diagram below shows a food web.

STEMUP.CO.UK



(a) What name is given to all the organisms together in an ecosystem?

Tick **one** box.

Community ☐

Environment ☐

Habitat ☐

Population ☐

(1)

(b) Give the name of **one** secondary consumer shown in the diagram above.

_____

(1)

Algae can photosynthesise.

(c) Which word describes the algae in this food web?

Tick **one** box.

Consumer ☐

STEMUP.CO.UK

Predator ☐

Prey ☐

Producer ☐

(1)

(d) Explain why most algae are found near the surface of the sea, and not at greater depths.

_____

_____

_____

_____

(2)

(e) Toothed whales will compete with each other for food.

Suggest what else toothed whales might compete for.

_____

_____

(1)

(f) Look at the diagram above.

The population of leopard seals decreases if there are fewer elephant seals.

Explain why.

_____

_____

_____

_____

(2)

(Total 8 marks)

Q5.

Owls are predators of mice and voles.

(a) Which of the following are biotic factors that would affect owl populations?

Tick **two** boxes.

STEMUP.CO.UK

Availability of food ☐

Carbon dioxide levels ☐

Moisture levels ☐

New diseases ☐

Oxygen levels ☐

Soil pH ☐

(2)

Scientists collected population data for mice, voles and owls from one woodland over two years.

(b) The scientists collected the data using sampling techniques.

Suggest why the population data collected may not be accurate.

_____

_____

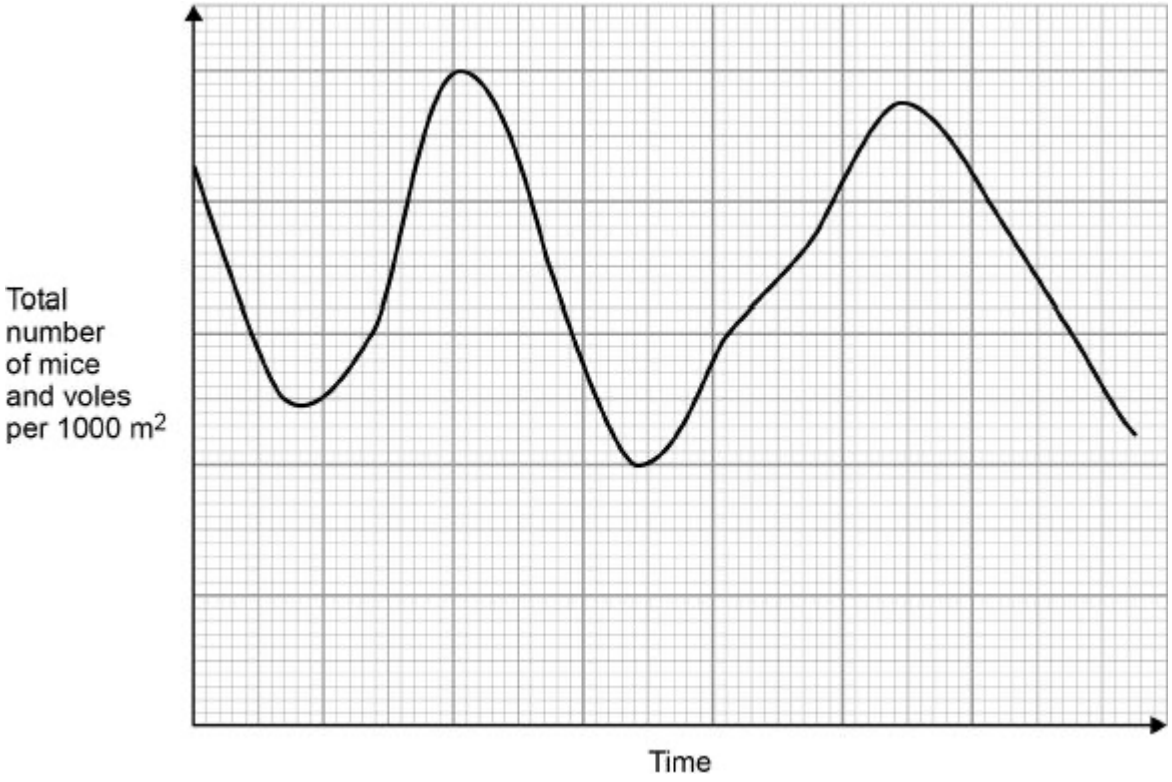
_____

_____

(2)

The graph below shows how the total number of mice and voles changed over two years.

STEMUP.CO.UK



(c) The number of owls also changed over the same time period.

The changes in the numbers followed a typical predator−prey relationship.

Sketch a line on the graph above to show how you would expect the number of owls to change.

(3)

(d) What would happen to the number of voles if the population of mice decreased?

Give reasons for your answer.

_____

_____

_____

_____

(2)

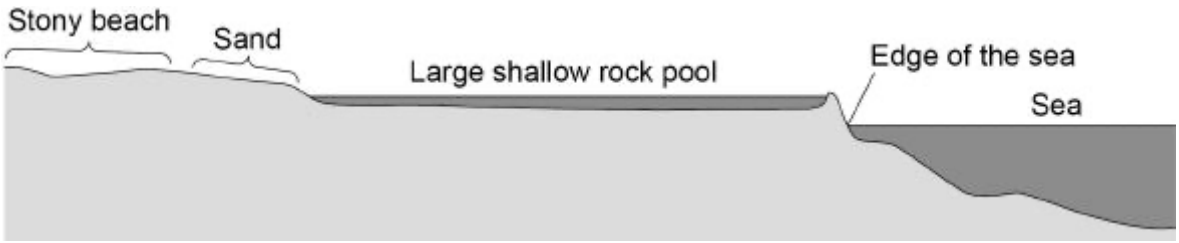
(Total 9 marks)

Q6.

Figure 1 shows a rocky shore.

Figure 1

STEMUP.CO.UK



Students were asked to investigate how the abundance and distribution of different organisms change as you move from the edge of the sea to the stony beach.

(a) Describe a method the students could use.

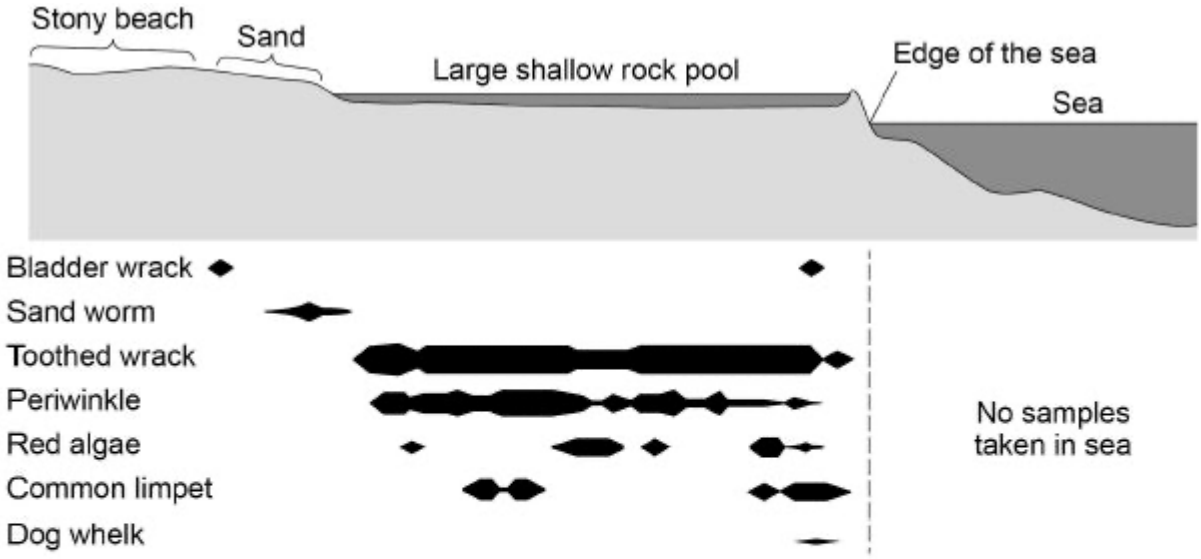
(6)

(b) A kite diagram shows the distribution and number of organisms.

Figure 2 shows a kite diagram of the results from a similar investigation on the same rocky shore.

Figure 2

STEMUP.CO.UK



Which organism was most abundant?

Give a reason for your answer.

_____

_____

_____

_____

(2)

(c) The shallow rock pool in **Figure 2** has a **higher biodiversity** than the sand or the stony beach.

Suggest **three** reasons why.

_____

_____

_____

_____

_____

_____

(3)

STEMUP.CO.UK

(Total 11 marks)

Q7.

This question is about ecology.

(a) Give **two** abiotic (non-living) factors which will affect the growth of plants on a school playing field.

Give a reason why each factor will affect the growth of the plants.

Abiotic factor 1 _____

Reason _____

_____

Abiotic factor 2 _____

Reason _____

_____

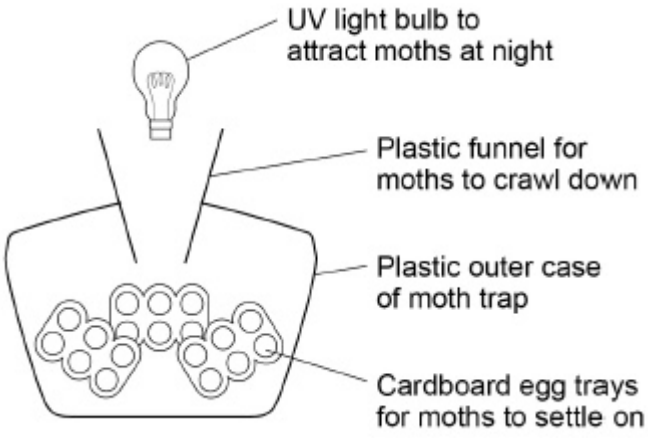
(4)

Students were studying the ecology of their playing field.

They wanted to count the population of ruby tiger moths.

Figure 1 shows the moth trap they used.

Figure 1



This is the method used.

1. Set up the moth trap on the playing field.
2. Leave the trap for several days with the light on.
3. Take the trap to the laboratory and carefully remove the egg trays.
4. Count the number of ruby tiger moths.
5. Release the moths on the playing field.

STEMUP.CO.UK

(b) The students needed other equipment to identify the ruby tiger moths.

What **two** other pieces of equipment did the students need?

Tick **two** boxes.

Electron microscope	☐
Hand lens	☐
Moth guide	☐
Quadrat	☐
Tape measure	☐

(2)

(c) Suggest **one** reason why the moths were counted in the laboratory.

_____

(1)

(d) Suggest **one** hazard in using the moth trap.

_____

(1)

(e) What precaution should the students take to minimise the hazard you suggested in part (d)?

_____

(1)

Figure 2 shows a caterpillar of the ruby tiger moth.

The head is sometimes bright orange in colour or there is a red stripe on the back.

Figure 2

STEMUP.CO.UK



(f) Give **one** reason why caterpillars of the ruby tiger moth have very few predators.

_____

_____

(1)

(Total 10 marks)

Q8.

In 2017, the city of Manchester began a 'City of Trees' project.

The project plans to plant 3 million trees over the next 25 years.

The trees will be used to:

- make existing woodlands larger
- link existing woodlands
- create new woodlands
- plant in parks, public gardens and along streets
- give to people to plant in private gardens.

(a) It was suggested that the council plant 3.6×10^5 trees in the first year.

The rest of the trees would be planted in equal numbers over the remaining years.

Calculate how many trees would need to be planted in each of the remaining years.

Give your answer in standard form.

_____

_____

_____

_____

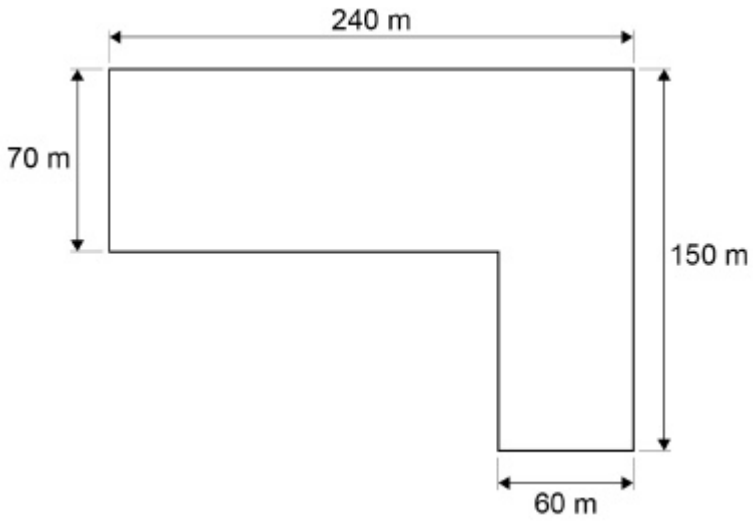
Number of trees = _____ per year

STEMUP.CO.UK

(3)

(b) Students investigated the number of bluebells in one of the existing woodlands.

The diagram shows the dimensions of the woodland.



The students used a 0.25 m^2 quadrat to sample the bluebell population.

The mean number of bluebells per quadrat was 6

Estimate the population of bluebells in the woodland.

_____

_____

_____

_____

Population = _____ bluebells

(2)

(c) A Manchester resident says that this project will 'fight pollution' and 'increase biodiversity' in their city.

Explain how the 'City of Trees' project will:

- reduce pollution
- increase biodiversity.

_____

_____

_____

_____

_____

_____

STEMUP.CO.UK

_____

_____

_____

_____

_____

_____

_____

_____

(6)

(Total 11 marks)

Q9.

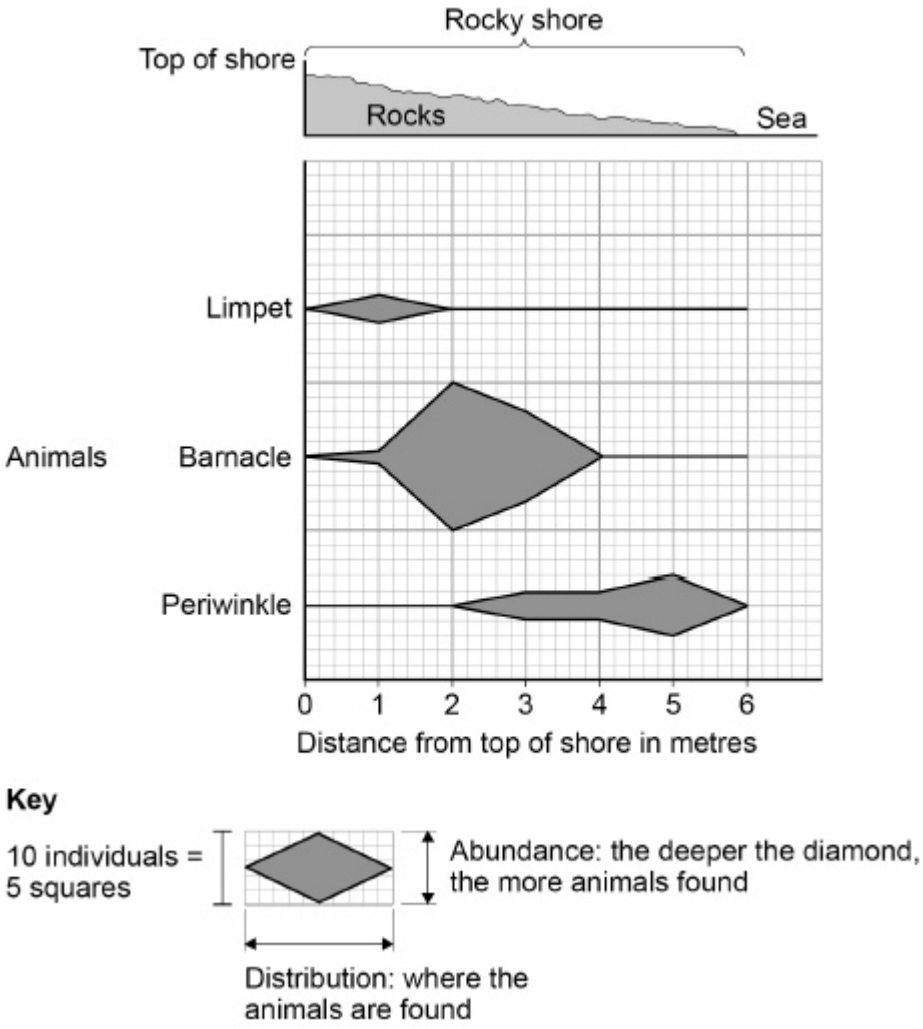
Rocky shores are a type of coastal habitat.

Limpets, barnacles and periwinkles are animals that live on rocky shores.

Students investigated the distribution of these animals on one rocky shore.

The figure shows their results.

STEMUP.CO.UK



The edge of the sea was six meters from the top of the shore.

(a) Calculate the total number of animals found one metre from the top of the shore.

_____

_____

Total number of animals = _____

(1)

(b) The greatest number of animals was found two metres from the top of the shore.

One student said that this was **not** the most biodiverse part of the shore.

Give the reason for this statement.

_____

_____

(1)

(c) Give **one** abiotic factor and **one** biotic factor that could affect the distribution of these animals on the shore.

STEMUP.CO.UK

Abiotic factor _____

Biotic factor _____

(2)

(d) Describe the method the students could have used to collect the data shown in the figure.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 8 marks)

Q10.

Moose are animals that eat grass.

Figure 1 shows a moose.

Figure 1

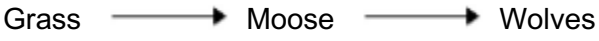


STEMUP.CO.UK

© Wildnerdpix/iStock/Thinkstock

Figure 2 shows a food chain.

Figure 2



(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

STEMUP.CO.UK

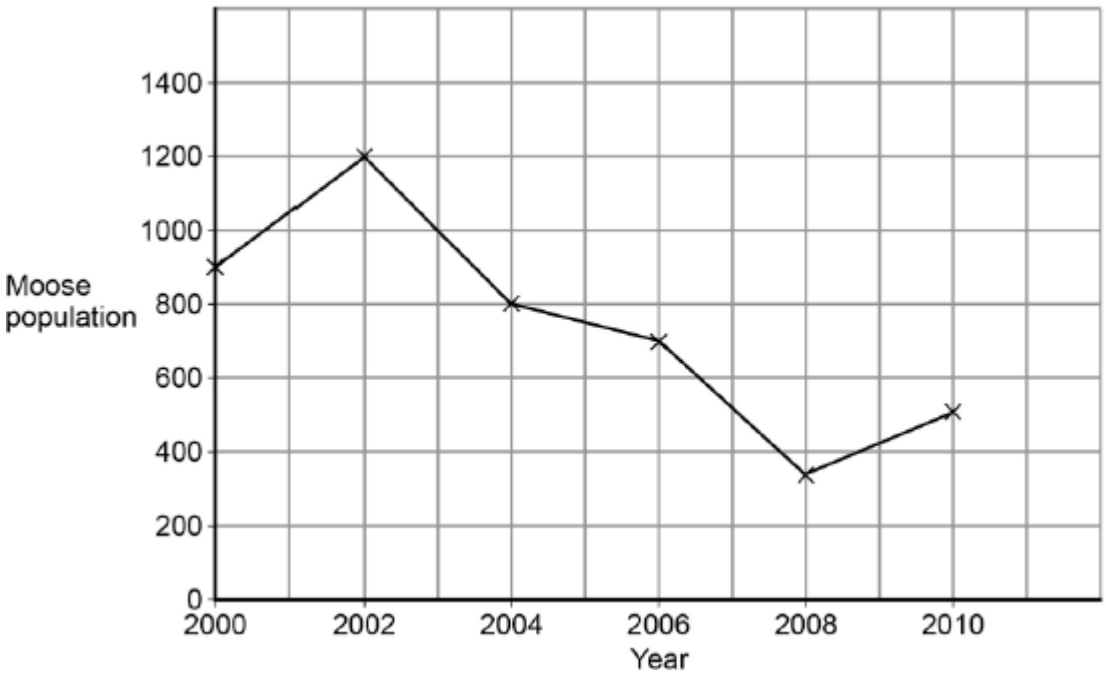
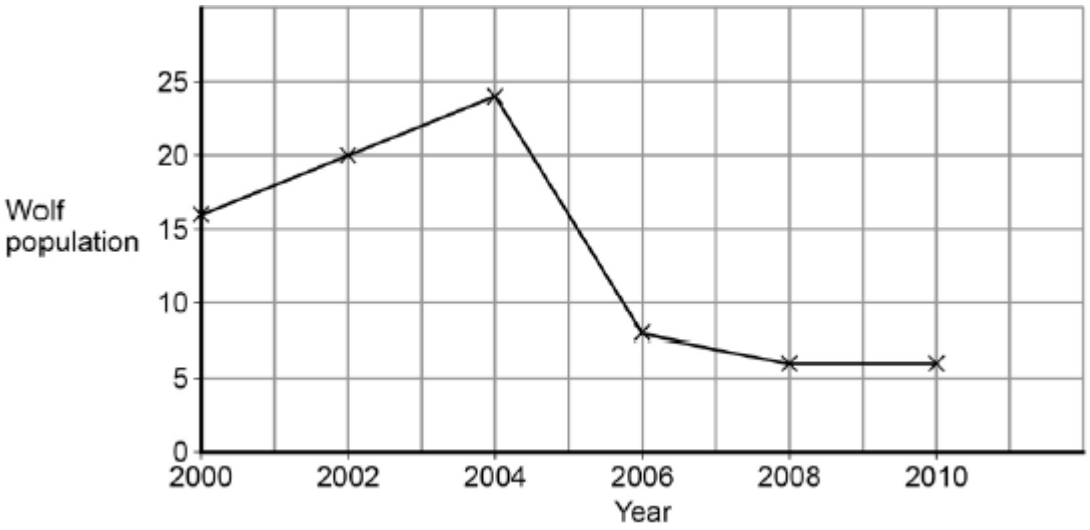


Figure 4



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.

STEMUP.CO.UK

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)

Q11.

Students used quadrats to estimate the population of dandelion plants on a field.

(a) Describe how quadrats should be used to estimate the number of dandelion plants in a field.

_____

_____

_____

_____

STEMUP.CO.UK

_____

_____

_____

_____

(4)

(b) The field measured 40 m by 145 m.

The students used 0.25 m^2 quadrats.

The students found a mean of 0.42 dandelions per quadrat.

Estimate the population of dandelions on the field.

_____

_____

_____

_____

Estimated population of dandelions = _____

(2)

(c) In one area of the field there is a lot of grass growing in the same area as dandelions.

Suggest why the dandelions may **not** grow well in this area.

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 10 marks)

Q12.

Moose are animals that eat grass.

Figure 1 shows a moose.

STEMUP.CO.UK

Figure 1



© Wildnerdpix/iStock/Thinkstock

Figure 2 shows a food chain.

Figure 2

Grass → Moose → Wolves

(a) Name the secondary consumer shown in **Figure 2**.

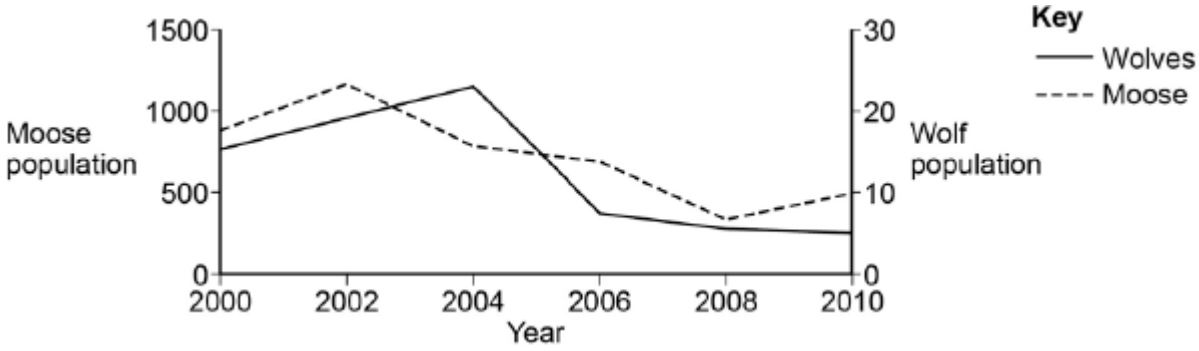
_____

(1)

(b) **Figure 3** shows how the moose population and wolf population have changed in one area.

This is a predator-prey cycle.

Figure 3



In 2004 the line on **Figure 3** for wolves is above the line for moose.

How does **Figure 3** show that there are more moose than wolves in 2004?

_____

_____

(1)

STEMUP.CO.UK

(c) Suggest why the moose population decreased between 2002 and 2004.

Use information from **Figure 3**.

_____

_____

(1)

(d) The number of wolves is one biotic factor that could affect the size of the moose population.

Give **two** other biotic factors that could affect the size of the moose population.

1. _____

_____

2. _____

_____

(2)

(e) Moose have distinct characteristics such as antlers.

Describe how moose may have evolved to have large antlers.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(5)

(Total 10 marks)

Q13.

The UK contains large areas of peat bogs that have been present for thousands of years.

(a) Peat is removed from peat bogs.

The peat can be mixed with air and added to garden compost.

STEMUP.CO.UK

The release of carbon dioxide from peat is a problem.

Give **two other** reasons why gardeners should use less peat-based compost in the future.

1. _____

_____

2. _____

_____

(2)

(b) Explain why mixing peat with air leads to the release of carbon dioxide.

_____

_____

_____

_____

_____

_____

_____

_____

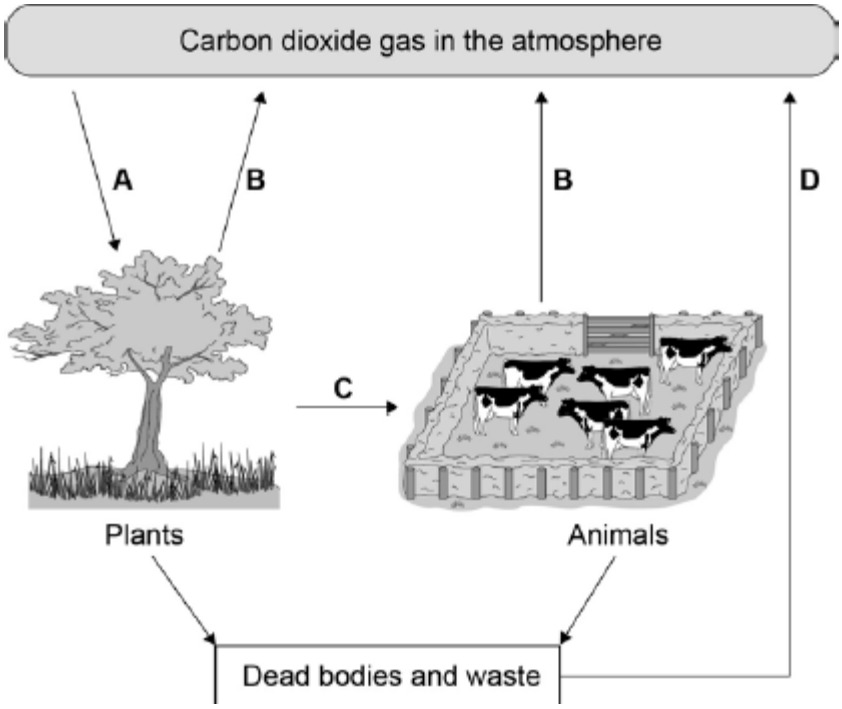
(4)

(Total 6 marks)

Q14.

The figure below shows the carbon cycle.

STEMUP.CO.UK



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 ☐

STEMUP.CO.UK

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)

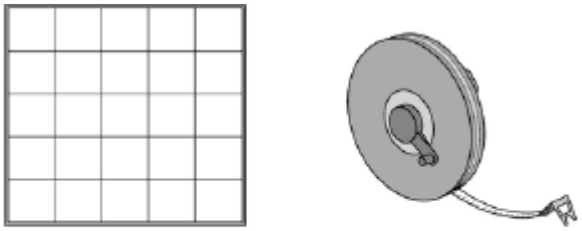
STEMUP.CO.UK

Q15.

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

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

Figure 1



Quadrat

Tape measure

Not drawn to scale

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 = _____

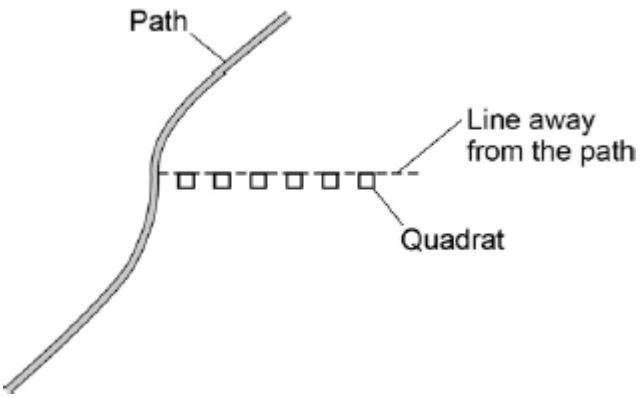
(1)

STEMUP.CO.UK

(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



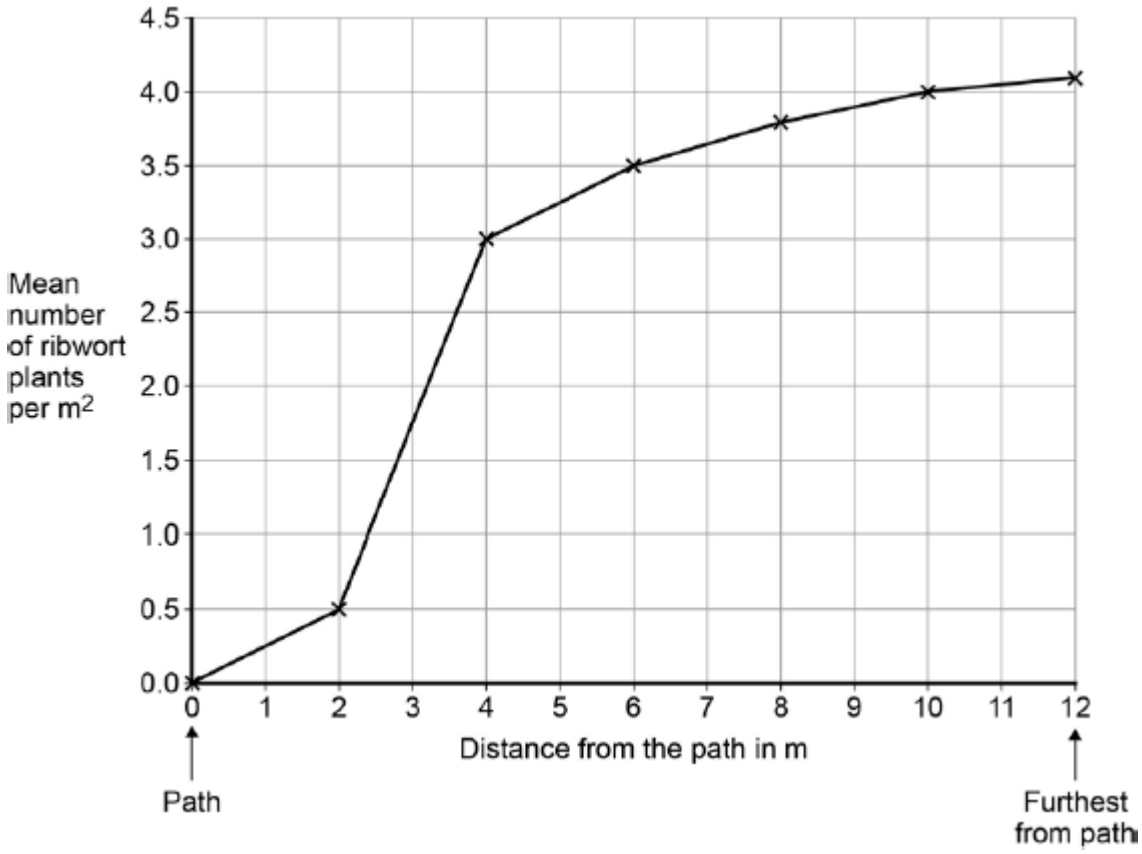
What is the name given to the line in **Figure 2**?

_____

(1)

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

Figure 3



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

_____

STEMUP.CO.UK

_____

_____

_____

(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	☐

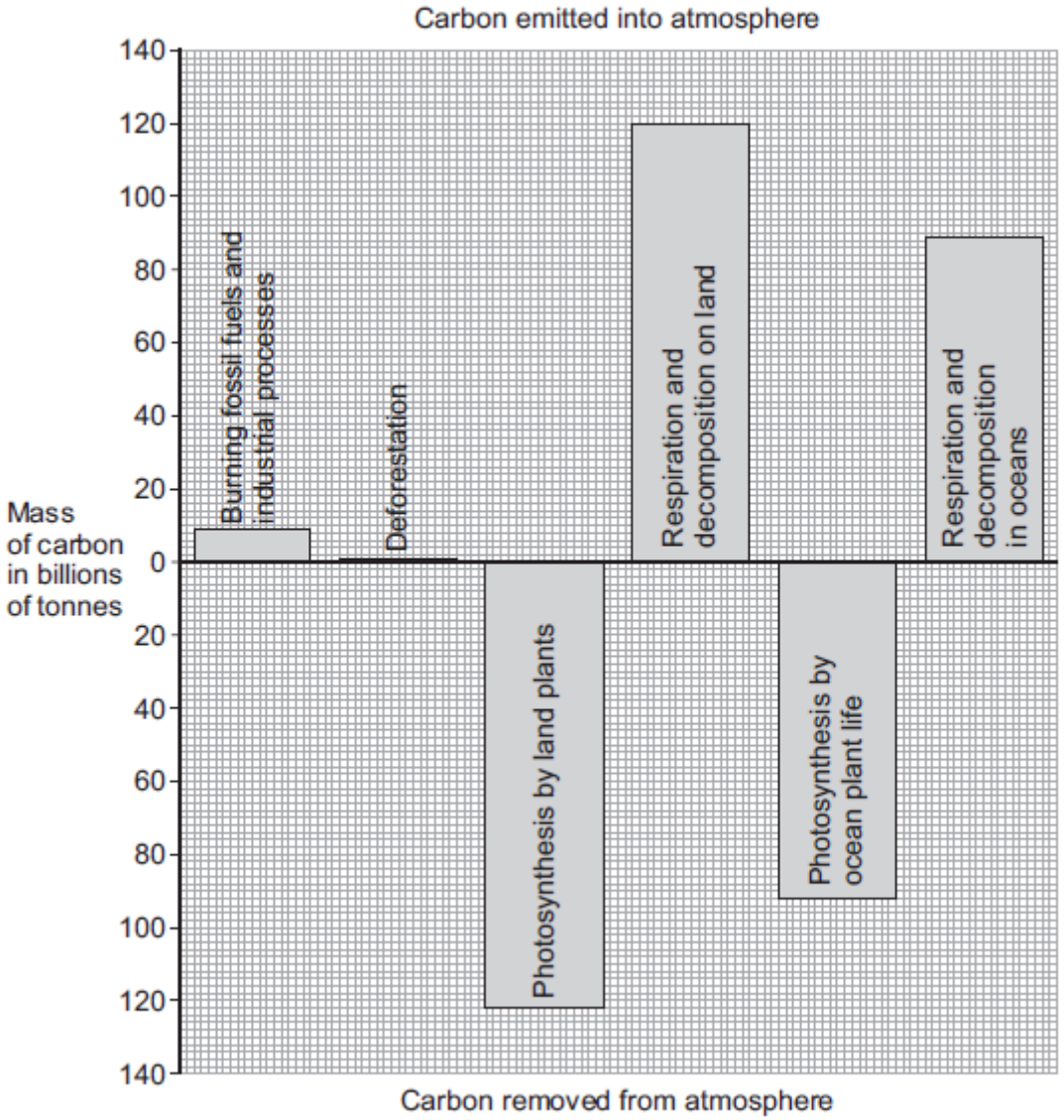
(1)
(Total 7 marks)

Q66.

The amount of carbon in the atmosphere is increasing.

The graph shows the mass of carbon in billions of tonnes involved in some processes in the carbon cycle each year.

STEMUP.CO.UK



(a) (i) Use information from the graph to calculate the total mass of carbon removed from the atmosphere each year.

_____

_____

_____ billions of tonnes

(2)

(ii) The mass of carbon in the atmosphere is increasing by 5 billion tonnes each year.

One tonne of carbon is equivalent to 3.67 tonnes of carbon dioxide.

Calculate the increase in the mass of carbon dioxide in the atmosphere each year.

_____

_____

STEMUP.CO.UK

_____ billion tonnes

(1)

(b) (i) Many scientists think the burning of fuels is the main cause of the increasing amount of carbon dioxide in the atmosphere. Other scientists disagree.

Use information from the graph to suggest why some scientists do **not** think that burning fuels is the main cause of the increase in carbon dioxide in the atmosphere.

_____

_____

_____

(1)

(ii) Some scientists think we should eat less meat and eat more food from plants.

Suggest how eating less meat and eating more food from plants could reduce the amount of carbon dioxide in the atmosphere.

_____

_____

_____

_____

(2)

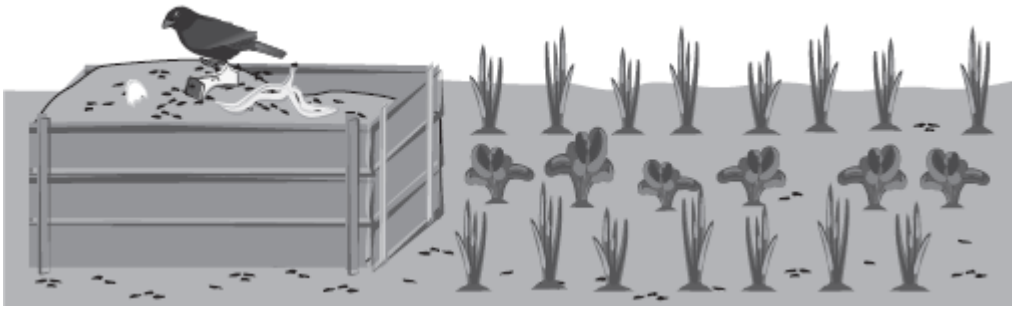
(Total 6 marks)

Q67.

A chef built a compost heap to recycle his vegetable and fruit peelings.

The compost heap soon had many earthworms living in it. The earthworms burrowed through the compost heap and ate the vegetable and fruit peelings. Blackbirds visited the compost heap and ate some of the earthworms.

The image shows the compost heap in the chef's vegetable garden.



(a) Suggest **two** reasons why having a compost heap is useful to the chef.

STEMUP.CO.UK

_____

_____

_____

_____

(2)

(b) The chef covered the compost heap with a plastic sheet. The plastic sheet stopped the birds eating the earthworms and also helped the decay process.

Suggest how the earthworms **and** the plastic sheet helped to speed up the process of decay.

_____

_____

_____

_____

_____

_____

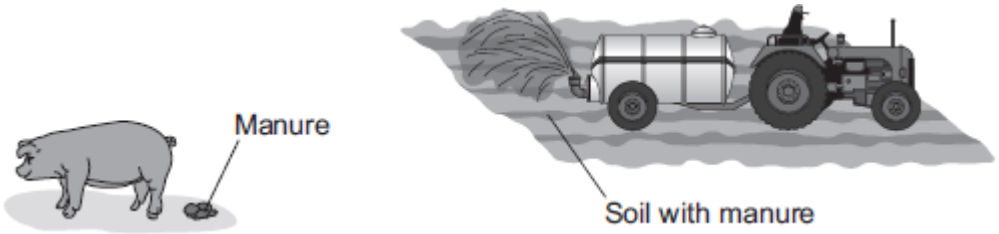
(3)

(Total 5 marks)

Q68.

Many farmers put pig manure on their crops to help the crops to grow as shown in the figure below.

Pig manure contains carbon compounds. The carbon compounds are broken down during the process of decay.



(a) (i) What type of organism breaks down the carbon compounds in pig manure?

_____

(1)

(ii) The process of decay releases substances that are useful to crops.

Name **two** of these substances.

Tick (✓) **two** boxes.

STEMUP.CO.UK

Carbon dioxide ☐

Light ☐

Nutrients ☐

Oxygen ☐

(2)

(b) Pig manure contains seeds from other plants, such as weeds.

What effect might weeds have on how fast the farmers' crops grow?

_____

Give a reason for your answer.

_____

_____

(2)

(Total 5 marks)

Q69.

In a stable community, the processes that remove carbon are balanced by processes that return carbon.

The figure below shows a woodland community.



Describe how carbon is recycled in a woodland community.

_____

_____

STEMUP.CO.UK

(Total 6 marks)

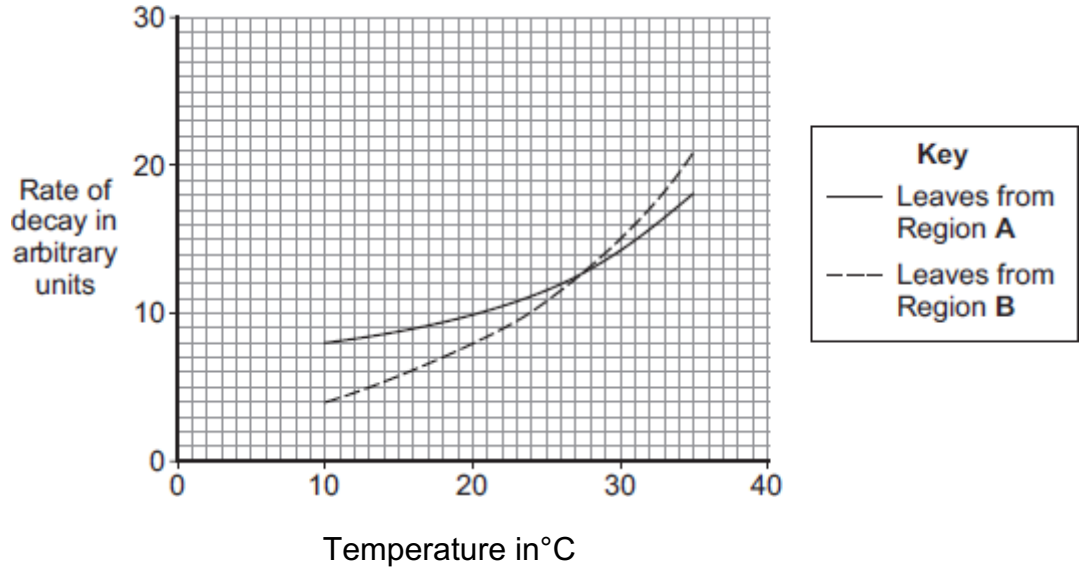
Q70.

Scientists collected leaves that had fallen from beech trees in two different parts of the UK, Region **A** and Region **B**.

Equal masses of leaves from the two regions were put in incubators at different temperatures. All other conditions were the same.

The leaves decayed in the incubators. The rate of decay of the leaves was measured.

The results are shown in the graph.



Give **two** conclusions you can make from the data and suggest a reason for each conclusion.

STEMUP.CO.UK

_____

_____

_____

_____

_____

_____

(Total 4 marks)

Q71.

A scientist investigated the effect of oxygen concentration and temperature on the rate of decay of leaves in a container.

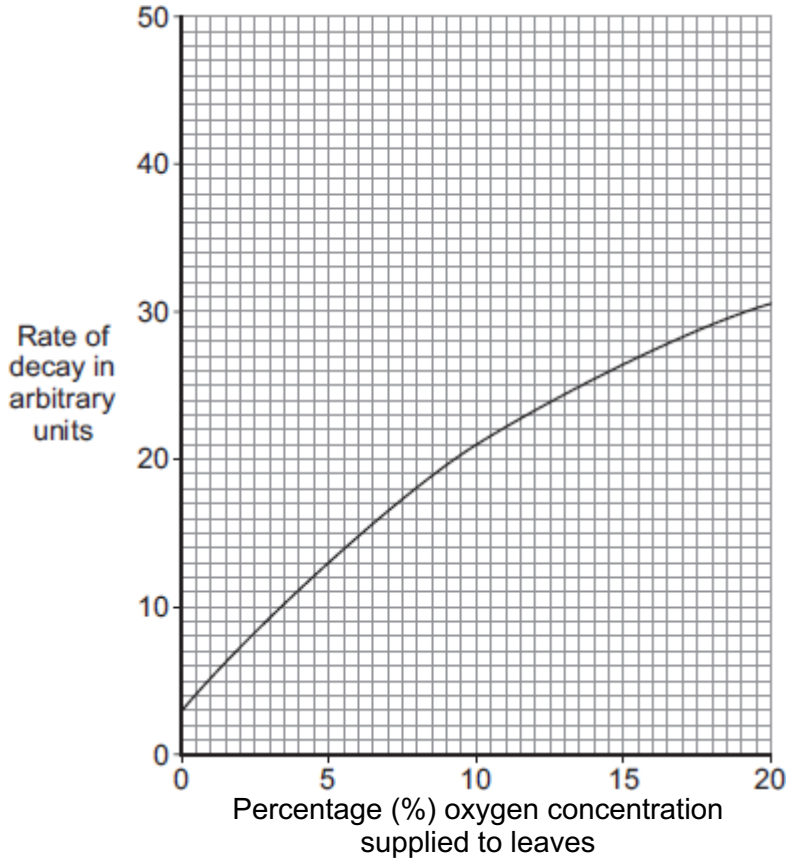
(a) Name equipment that could be used to measure the temperature and the concentration of oxygen in the container of leaves.

Temperature: _____

Concentration of oxygen: _____

(2)

(b) The results for oxygen concentration are shown in the graph.



(i) What was the rate of decay at an oxygen concentration of 5%?

_____ arbitrary units

STEMUP.CO.UK

(1)

(ii) What conclusion can be made from the results shown in the graph?

_____

_____

(1)

(c) Temperature can affect the rate of decay.

The graph shows the rate of decay at different oxygen concentrations when the temperature was 20 °C.

Draw a line on the graph to show the results you would expect at a temperature of 15 °C.

(1)

(d) Complete the following sentences about decay processes.

Materials are constantly cycled.

Dead organisms decay because they are broken down and digested by

_____

The decay process releases substances. These substances help the growth of

_____

Carbon dioxide is also released when dead organisms decay. Carbon dioxide

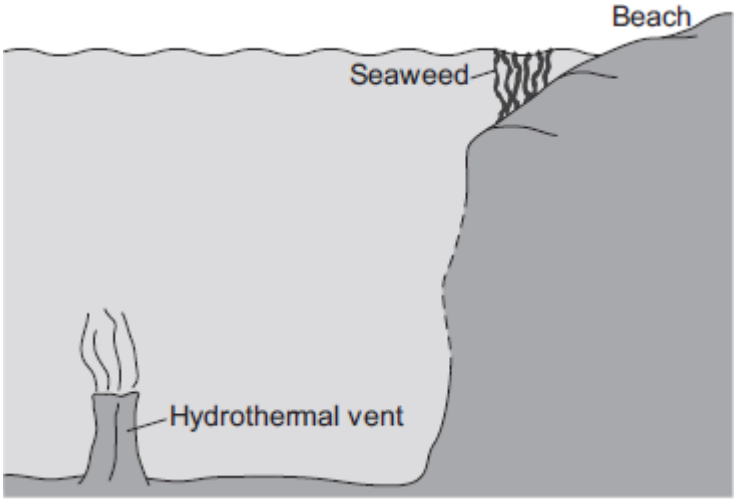
is a waste product of _____ .

(3)

(Total 8 marks)

Q72.

There are areas in deep seas where there are hot water springs called hydrothermal vents.



Not to scale

STEMUP.CO.UK

Volcanic activity creates an environment of very hot, acidic water.

No light reaches the deep seabed.

The environment is very extreme but many different organisms can live there.

(a) Complete the following sentence.

Organisms that can survive in extreme conditions are called

_____

(1)

(b) In the hydrothermal vents bacteria absorb toxic chemicals from the hot water. The bacteria use the chemicals to produce carbohydrates for the rest of the food chain.

The bacteria are eaten by limpets, which are eaten by crabs.

In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

The food chains show some organisms that live near a hydrothermal vent and some organisms that live near the surface of the sea.

A food chain found near a hydrothermal vent:

bacteria → limpet → crab

A food chain found near the surface of the sea:

green seaweed → limpet → crab

- Give a difference between the food chain found near a hydrothermal vent and the food chain found near the surface of the sea.
- Use information given in this question and your own knowledge to suggest reasons for the difference.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

STEMUP.CO.UK

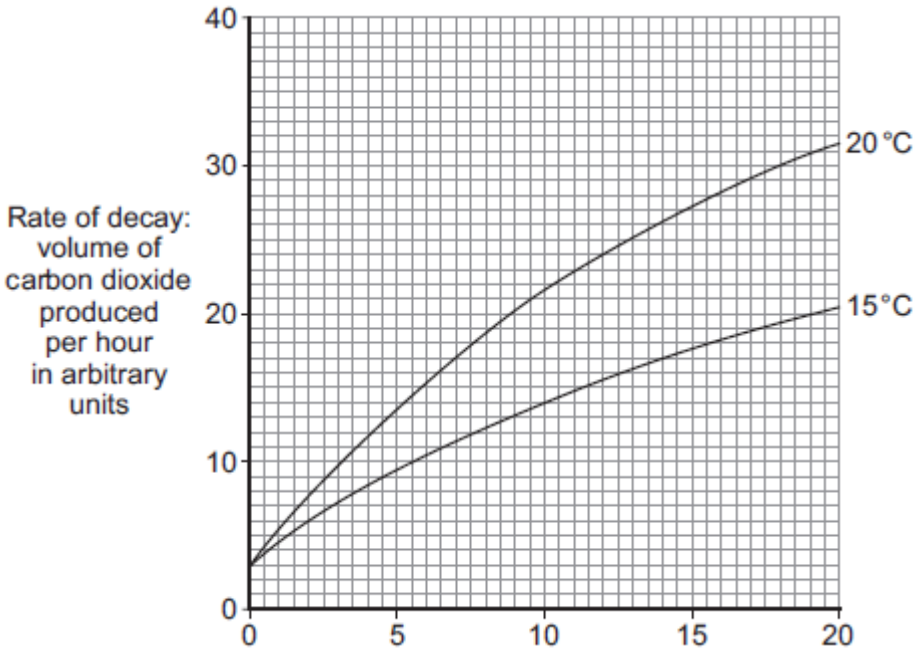
(6)

(Total 7 marks)

Q73.

A scientist investigated the effect of oxygen concentration and temperature on the rate of decay of leaves in a container.

The scientist's results are shown in the graph.



(a) The rate of decay is measured as the volume of carbon dioxide produced per hour.

Explain why carbon dioxide is produced during the process of decay.

STEMUP.CO.UK

_____

_____

_____

(3)

(b) Give **two** conclusions that can be made from the results shown in the graph.

_____

_____

_____

_____

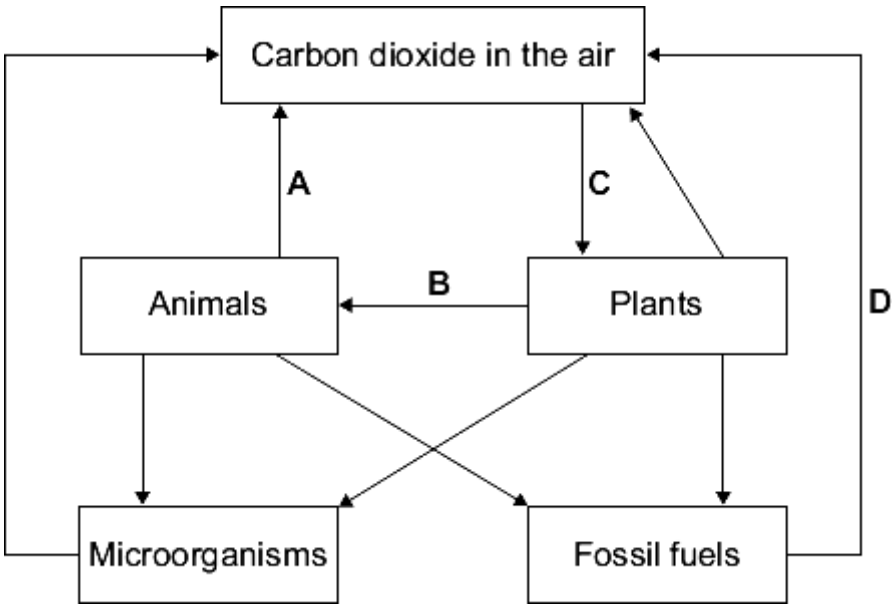
_____

(2)

(Total 5 marks)

Q74.

The diagram shows part of the carbon cycle.



Name the processes labelled **A**, **B**, **C** and **D**, on the diagram.

A _____

B _____

C _____

D _____

(Total 4 marks)

Q75.

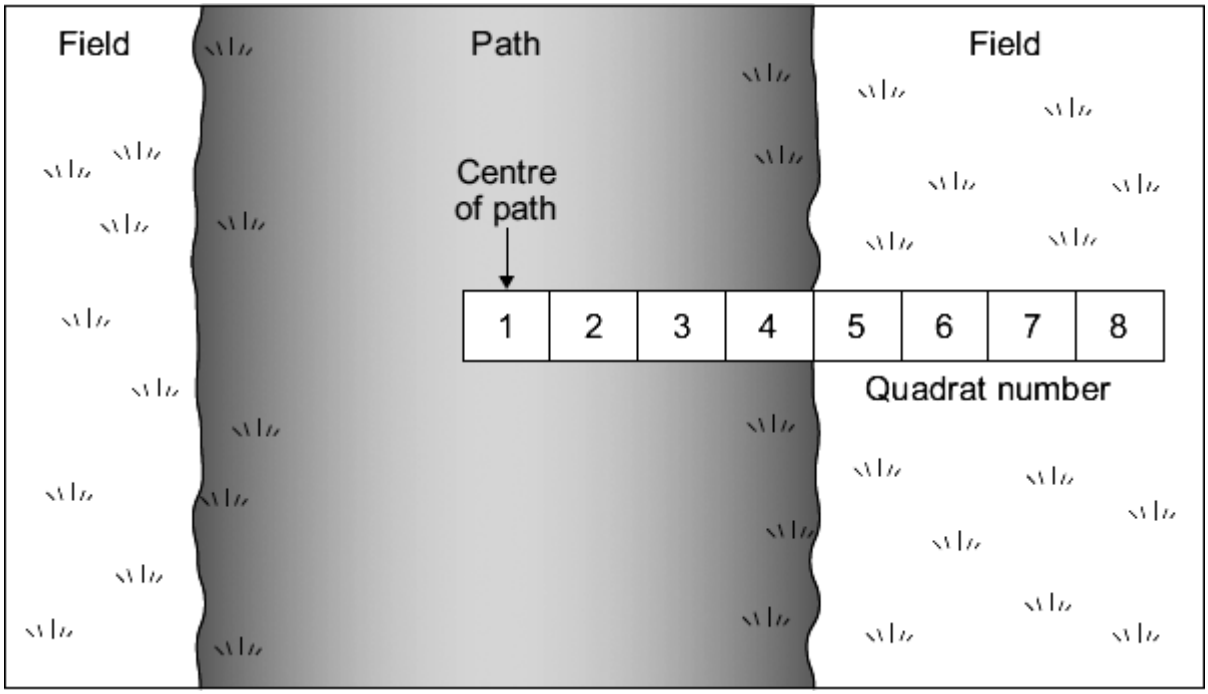
STEMUP.CO.UK

Greater plantain and Ribwort plantain are two types of plant.

Students investigated the distribution of these two plants across a path.

The students wanted to find out how the two plants were affected when people walked along the path. The students used a grid called a quadrat.

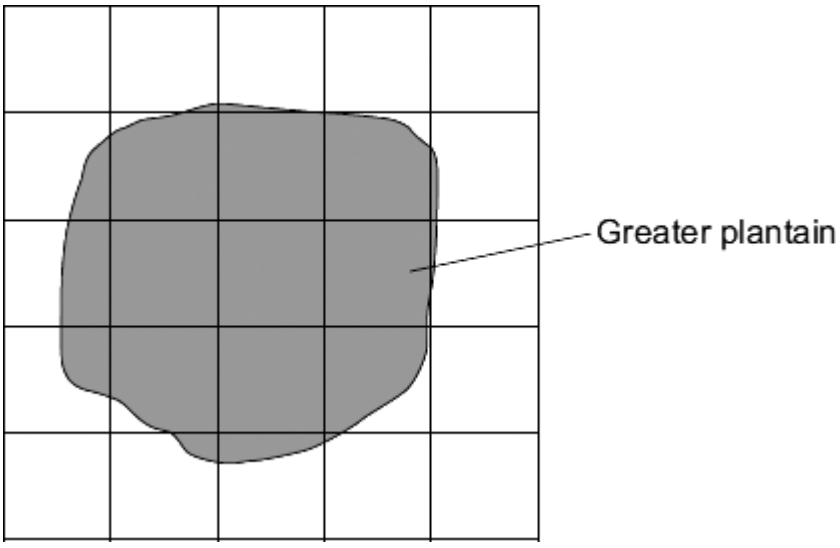
The diagram shows where the students put the quadrats.



Each quadrat was divided into 25 smaller squares.

The students used the squares to estimate the percentage cover of each type of plantain within the quadrat.

(a) Estimate the percentage of the quadrat covered by Greater plantain.



STEMUP.CO.UK

Percentage = _____

(2)

(b) The results are shown in the table.

	Mean percentage cover							
Quadrat number	1	2	3	4	5	6	7	8
Greater plantain	31	28	28	19	3	2	1	1
Ribwort plantain	3	4	6	29	29	37	40	39

(i) Use information from the table to describe the distributions of Greater plantain and Ribwort plantain.

_____

_____

_____

_____

(2)

(ii) The drawings show the two types of plantain.



Ribwort plantain



Greater plantain

Use information from the drawings to suggest why there is the difference in the distribution of the two types of plantains you described in part (b)(i).

_____

_____

_____

_____

(2)

(c) The students decided to investigate the distribution of these two types of plantain in two areas of the school grounds.

STEMUP.CO.UK

- Area 1 – the school football pitch.
- Area 2 – grass in an area where nobody walks.

Predict what the students would find out.

Give the reason for your prediction.

_____

_____

_____

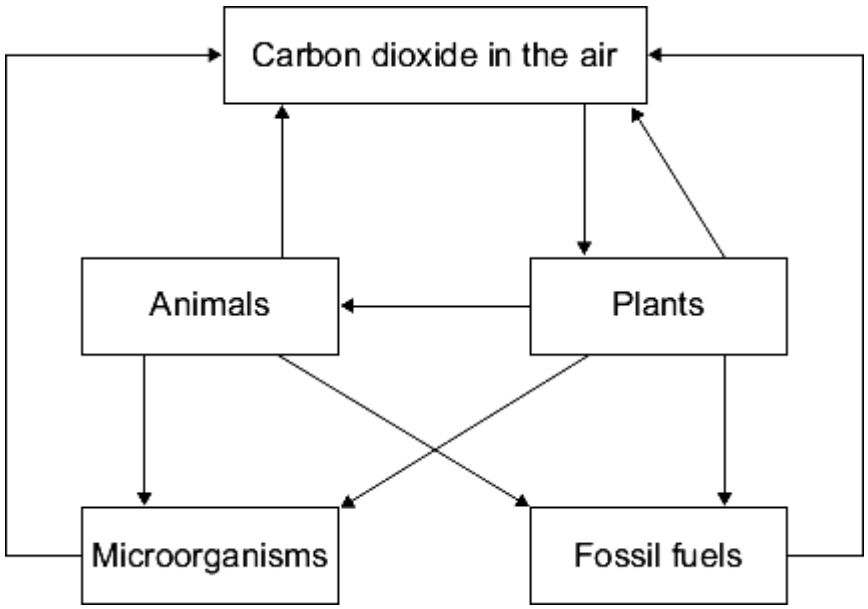
_____

(2)

(Total 8 marks)

Q76.

The diagram shows part of the carbon cycle.



Use the information in the diagram and your own knowledge to describe in detail how carbon is cycled between living organisms and the air.

Your answer should include the names of any processes involved.

_____

_____

_____

_____

_____

_____

STEMUP.CO.UK

_____

_____

_____

_____

_____

_____

(Total 6 marks)

Q77.

Approximately a third of UK household rubbish is organic matter such as food waste and gardening rubbish.



Many councils have large-scale composting schemes to decompose this rubbish. The products from this process can be sold. This pays for some of the cost of collecting and processing the rubbish.

(a) Which **two** of the following are reasons to encourage more councils to have large-scale composting schemes?

Tick (✓) **two** boxes.

There will be less household rubbish ☐

They produce substances that help plants grow ☐

They do not cost anything ☐

They reduce landfill ☐

STEMUP.CO.UK

(2)

(b) What conditions are needed to decompose organic waste?

Tick (✓) **two** boxes.

Plenty of carbon dioxide ☐

Dry conditions ☐

Plenty of oxygen ☐

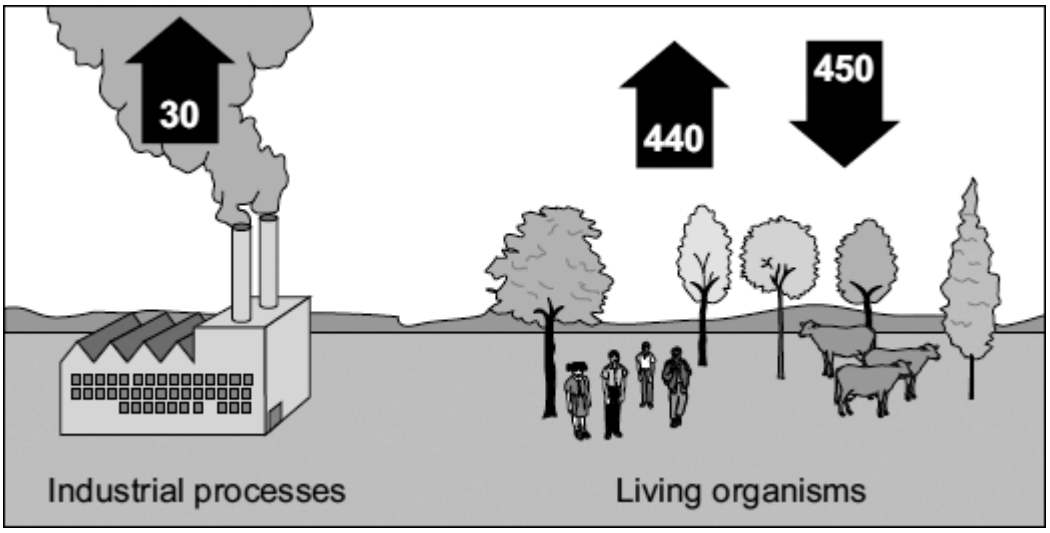
Warm conditions ☐

(2)

(Total 4 marks)

Q78.

The diagram shows the mass of carbon dioxide released into and removed from the air each year in billions of tonnes.



(a) Complete the following sentences.

(i) Plants remove carbon dioxide from the air by a process

called _____

(1)

(ii) All organisms produce carbon dioxide during a process

called _____

(1)

STEMUP.CO.UK

(b) Too much carbon dioxide in the atmosphere can harm the environment.

Suggest **two different** ways of reducing the amount of carbon dioxide in the atmosphere.

_____

_____

_____

_____

(2)

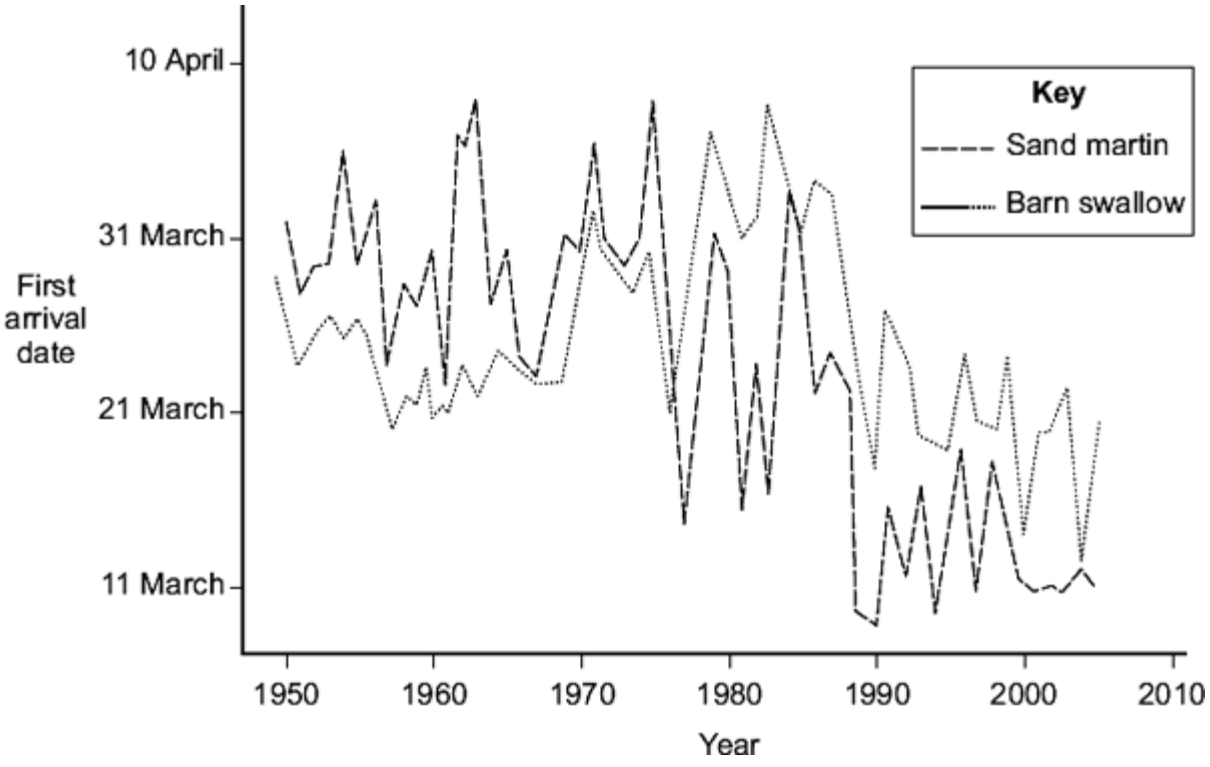
(Total 4 marks)

Q79.

Scientists have observed changes in the migration patterns of some species of birds.

The graph shows the arrival dates in the UK of two species of birds, the Sand martin and the Barn swallow.

Both birds feed on flying insects.



(a) What **two** changes in migratory patterns are shown in the data?

Tick (✓) **two** boxes.

Birds fly at faster speeds than they used to ☐

STEMUP.CO.UK

Barn swallows arrive later to the UK than they used to ☐

Sand martins have always arrived in the UK before Barn swallows ☐

Both birds arrive earlier to the UK than they used to ☐

After 1970 the order that the two birds arrive in the UK reversed ☐

(2)

(b) The migratory patterns of the two birds have changed.

Suggest **one** reason why.

_____

_____

(1)

(Total 3 marks)

Q80.

Approximately a third of UK domestic rubbish is organic matter such as food waste and gardening rubbish.

Many councils have started industrial composting schemes to decompose these wastes. One product of the decomposition is compost (decaying organic matter).

Use this information and your own knowledge to suggest reasons why more councils should be encouraged to start industrial composting schemes.

_____

_____

_____

_____

_____

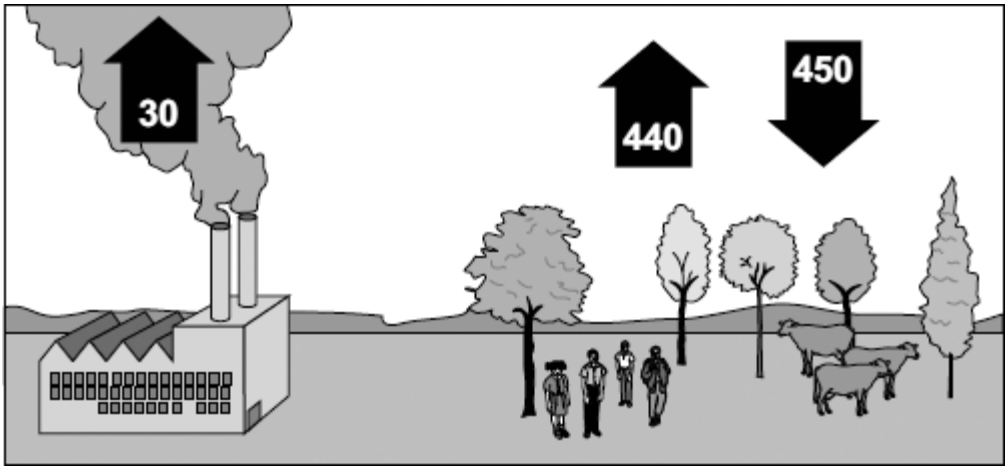
_____

(Total 3 marks)

Q81.

The diagram shows the mass of carbon dioxide released into and removed from the air each year in billions of tonnes.

STEMUP.CO.UK



Describe the processes **shown on the diagram** that exchange carbon dioxide with the air.

Explain the overall effect of these processes on the mass of the carbon dioxide in the air.

(Total 6 marks)

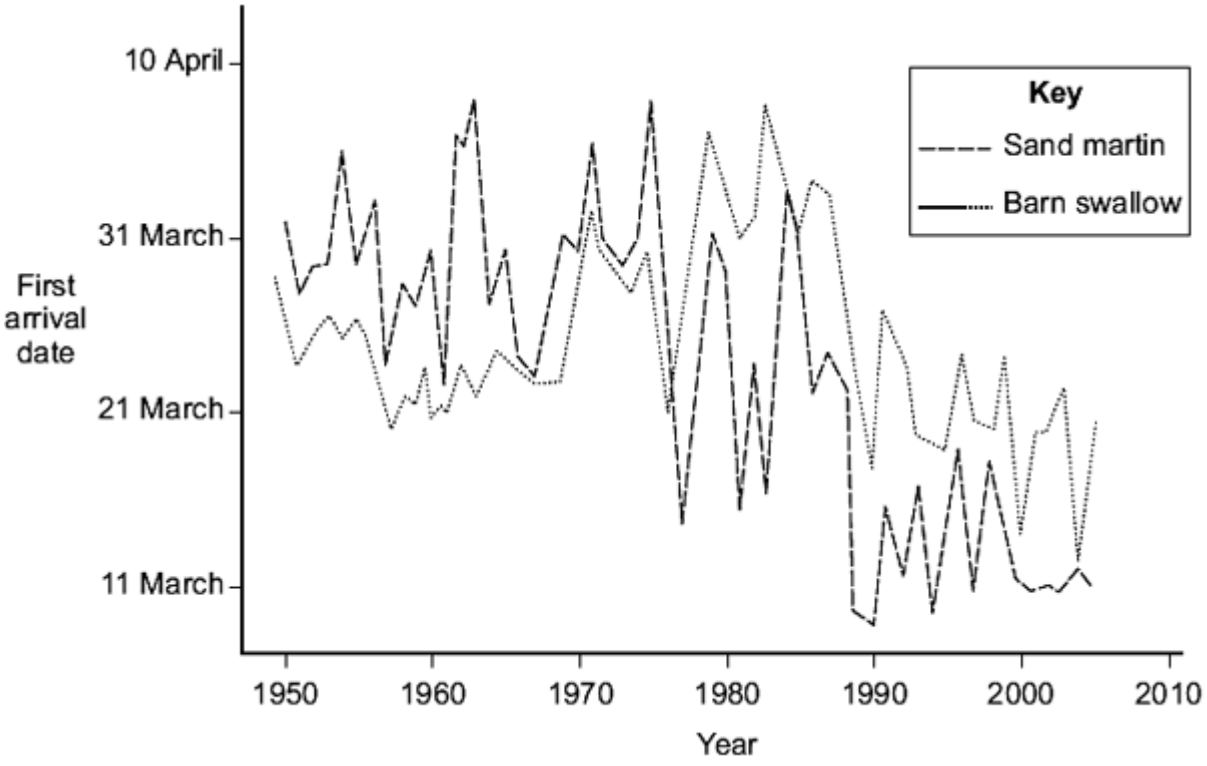
Q82.

Scientists have observed changes in the migration patterns of some species of birds.

The graph shows the arrival dates in the UK of two species of birds, the Sand martin and the Barn swallow.

Both birds feed on flying insects.

STEMUP.CO.UK



(a) Give **two** changes in migratory patterns shown in the data.

_____

_____

_____

_____

(2)

(b) Suggest reasons for the change in the migration pattern of the Sand martin.

_____

_____

_____

_____

(2)

(Total 4 marks)

STEMUP.CO.UK