AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



EXAM QUESTION PACK

4.7.1 ADAPTATIONS, INTERDEPENDENCE AND COMPETITION (PACK 5)

SCORE	PERCENTAGE
/231	%

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Q1.

Every year scientists have recorded the date when migrating birds arrived at summer breeding grounds in the UK.

The records show that for every 1 °C increase in mean global temperature, the birds arrived one day earlier.

(a) What will the birds be competing for when they arrive at their UK breeding grounds?

Tick **two** boxes.

Eggs ☐

Food ☐

Light ☐

Mates ☐

Oxygen ☐

(2)

(b) Birds that arrive early might survive better than birds that arrive later.

Suggest **one** reason why.

_____

_____

(1)

(c) Global temperatures are increasing every year.

This is because of an increase of greenhouse gases in the atmosphere.

Name **one** greenhouse gas.

_____

(1)

(d) Global warming affects the migration of animals.

Give **one** other effect of global warming.

_____

_____

(1)

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(e) Which **two** human activities cause global warming?

Tick **two** boxes.

- Burning fossil fuels ☐
- Eating vegetables ☐
- Farming cows ☐
- Turning off lights ☐
- Using too much water ☐

(2)

(f) Which gas in the atmosphere causes acid rain?

Tick **one** box.

- Carbon monoxide ☐
- Oxygen ☐
- Ozone ☐
- Sulfur dioxide ☐

(1)
(Total 8 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		

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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.

_____

_____

_____

_____

_____

_____

_____

_____

(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 _____

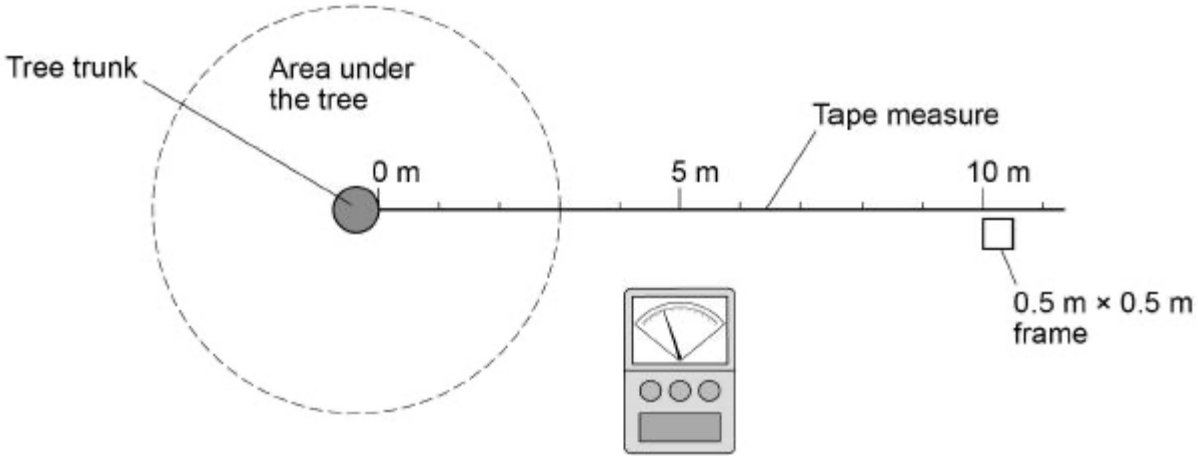
(2)

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.

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(d) Calculate the total area sampled.

_____

_____

Total area sampled = _____ m^2

(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

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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)

(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.

Scientists have removed microorganisms from inside rocks in caves in Mexico.

The microorganisms have been trapped there for between 10 000 and 50 000 years.

The caves are dark, very hot, humid and acidic.

(a) Why are these microorganisms called extremophiles?

Tick **two** boxes.

They are thousands of years old ☐

They survive in high humidity ☐

They survive in high temperatures ☐

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They survive in the dark ☐

They survive inside rocks ☐

They survive where it is acidic ☐

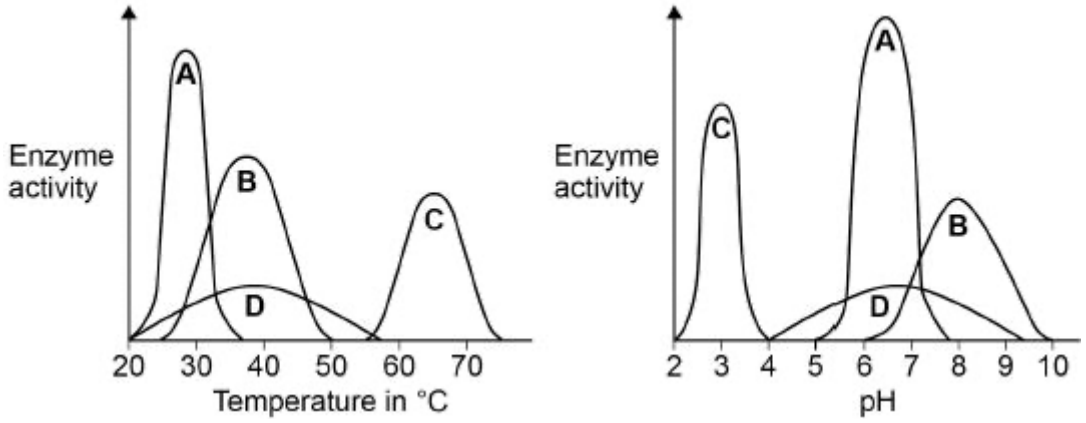
(2)

The microorganisms have been inactive for thousands of years but the scientists have reactivated them.

The diagram below shows the results of enzyme analysis on four enzymes, **A**, **B**, **C** and **D**.

Three of the enzymes were from microorganisms found in the soil near the caves.

One of the enzymes was from a reactivated microorganism from the caves.



(b) Which enzyme comes from the microorganism from the caves?

Tick **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

(1)

(c) Give the reasons for your answer to part **(b)**

_____

_____

_____

(1)

(d) Carl Woese developed the 'three-domain system' of classification.

Describe the 'three-domain system' of classification.

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_____

_____

_____

_____

_____

_____

(3)

(e) Most of the microorganisms from the caves were classified as belonging to the Archaea domain of the 'three-domain system'.

Suggest why.

_____

_____

(1)

(Total 8 marks)

Q4.

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.

_____

_____

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(3)

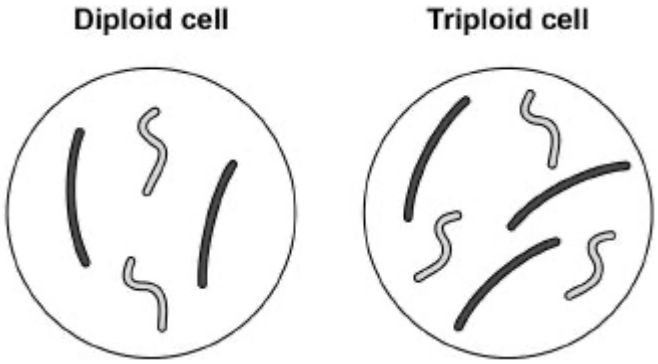
Biologists have discovered a way to produce oysters that have three sets of chromosomes (triploid) instead of the usual two sets (diploid).

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

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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. _____

_____

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.

_____

_____

_____

_____

_____

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_____

_____

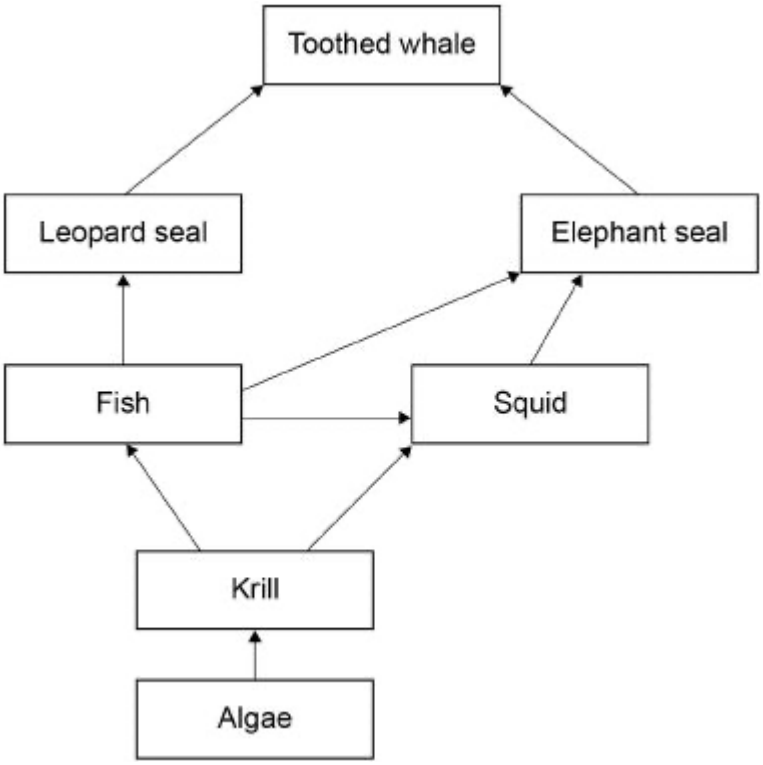
(6)

(Total 15 marks)

Q5.

The diagram below shows a food web.

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(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 ☐

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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)

Q6.

Owls are predators of mice and voles.

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

Tick **two** boxes.

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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.

_____

_____

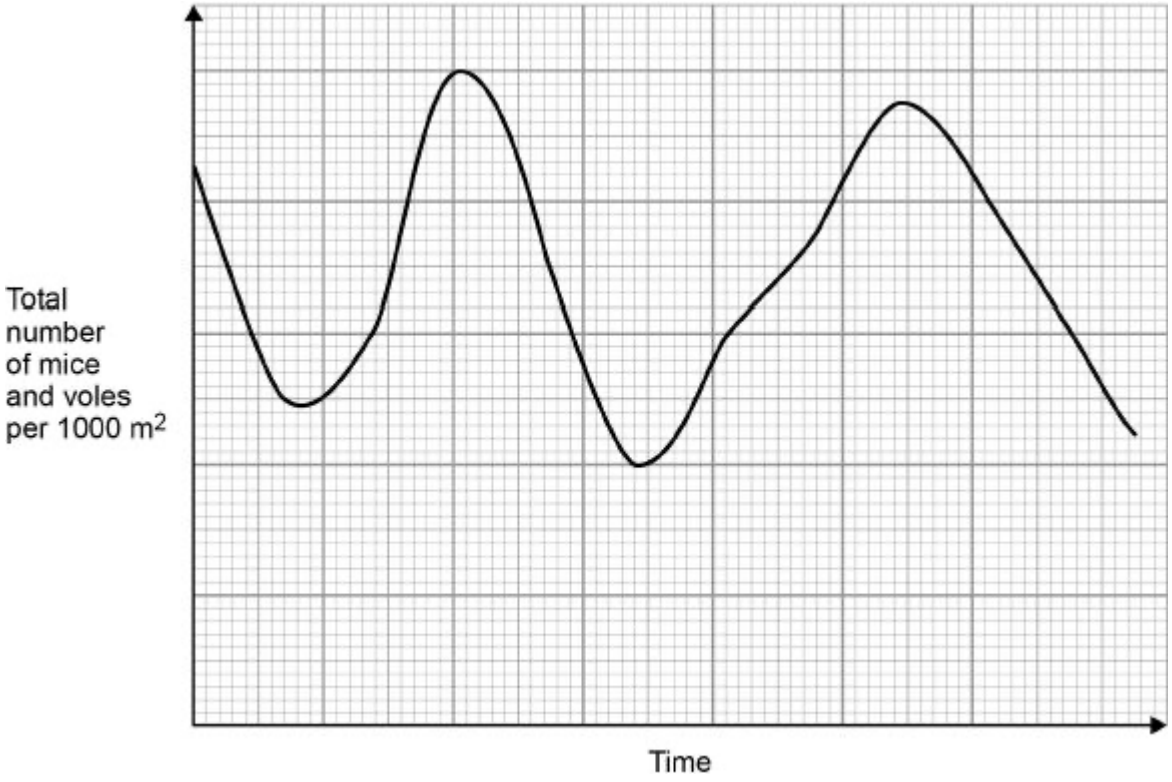
_____

_____

(2)

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

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(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)

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 _____

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Reason _____

_____

Abiotic factor 2 _____

Reason _____

_____

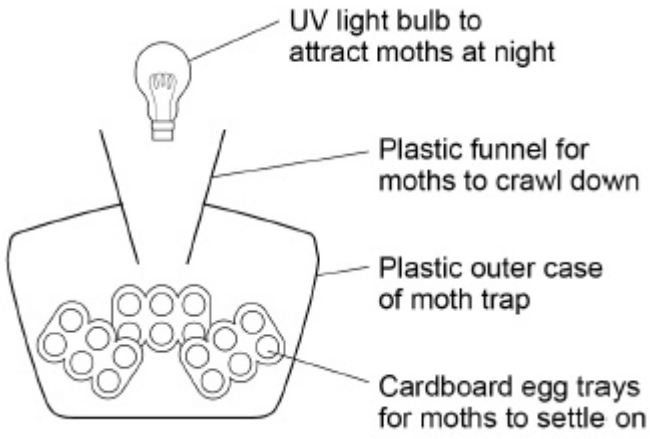
(4)

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.

(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 ☐

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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



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

_____

_____

(1)

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(Total 10 marks)

Q8.

Some animals are adapted to survive in very cold conditions such as the Arctic.

Explain how the adaptations of Arctic animals help them to survive in cold conditions.

(Total 6 marks)

Q9.

Fall armyworms are native to America.

Fall armyworms eat corn plants.

(a) The binomial name for fall armyworms is *Spodoptera frugiperda*.

Fall armyworms belong to an order of insects called Lepidoptera.

The table shows a classification table for the fall armyworm.

Complete the table.

Classification group	**Name**

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Kingdom	
	Arthropoda
	Insecta
Order	Lepidoptera
Family	Noctuidae
	frugiperda

(2)

Fall armyworms have been found in Africa.

By 2016 they had spread rapidly destroying corn crops.

(b) Suggest **one** reason why the fall armyworms are spreading so rapidly in Africa.

_____

_____

(1)

(c) Fall armyworms:
- are **not** worms (annelids)
- are the caterpillars of moths (arthropods).

Describe **one** way scientists could tell if a new 'worm' they found should be classified as an annelid or as an arthropod.

_____

_____

(1)

(d) In parts of Africa, aeroplanes have been used to spray insecticide on crops, to kill the worms.

Explain the advantages and disadvantages of spraying insecticide on the corn crops.

_____

_____

_____

_____

_____

_____

_____

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_____

_____

(4)

(Total 8 marks)

Q10.

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.

_____

_____

_____

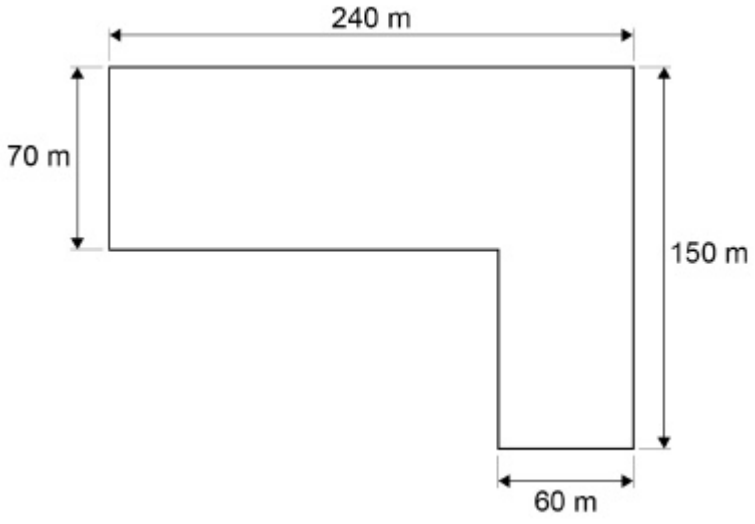
_____

Number of trees = _____ per year

(3)

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

The diagram shows the dimensions of the woodland.



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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.

(6)

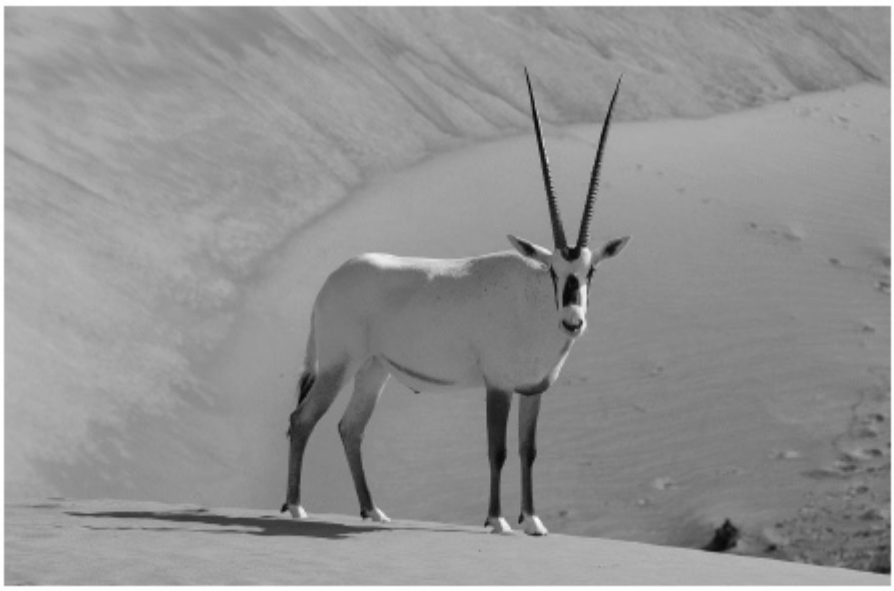
(Total 11 marks)

Q11.

The Arabian oryx (*Oryx leucoryx*) is a mammal that was once extinct in the wild.

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The image shows an Arabian oryx.



(a) What is the genus of the Arabian oryx?

Tick **one** box.

leucoryx ☐ *Oryx* ☐ *Oryx leucoryx* ☐

(1)

(b) Give **two** adaptations of the Arabian oryx to living in hot desert environments.

Use information from the image.

1. _____

_____

2. _____

_____

(2)

(c) The Arabian oryx uses its long horns to fight for territory and mates.

Describe how the long horns could have evolved.

_____

_____

_____

_____

_____

_____

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(3)

Arabian oryx from many different zoos were interbred so that they could be reintroduced to the wild.

(d) What is the name of this method of increasing the population of endangered animals?

Tick **one** box.

Breeding programme	☐
Genetic modification	☐
Natural selection	☐
Selective breeding	☐

(1)

(e) Explain why it was important to use Arabian oryx from many different zoos instead of one zoo.

_____

_____

(1)

(Total 8 marks)

Q12.

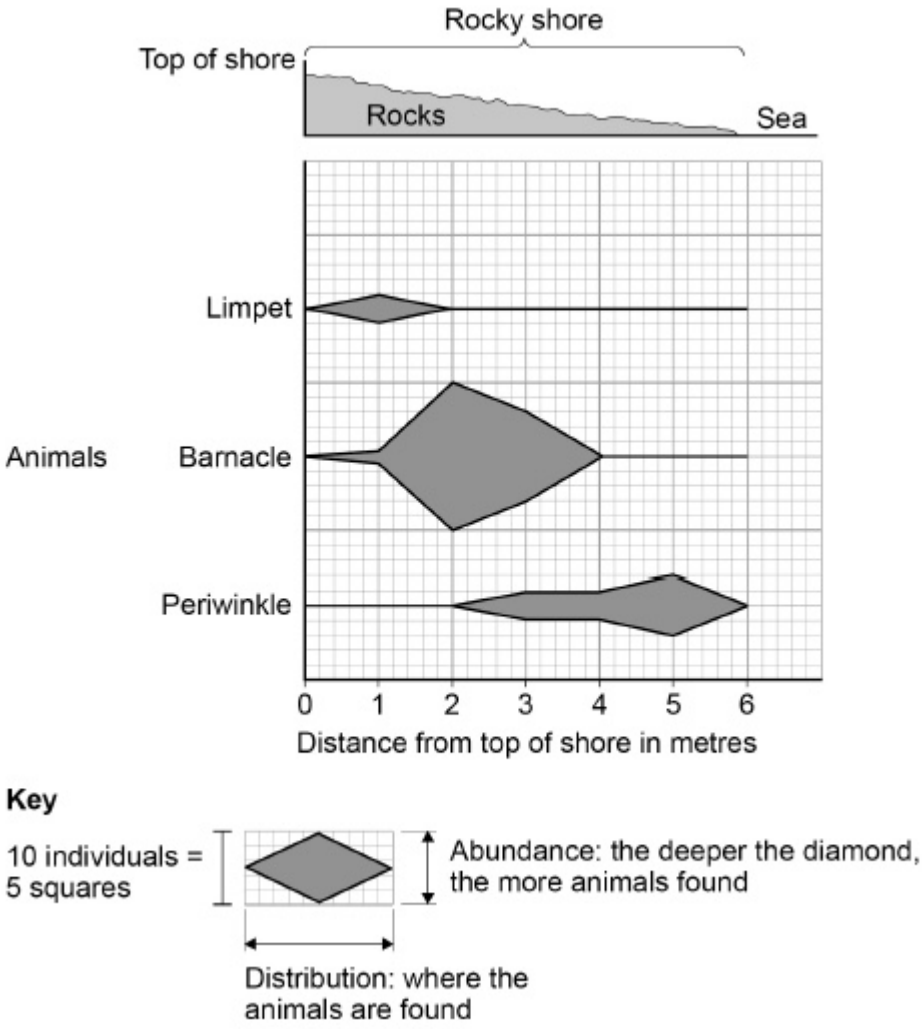
Rocky shores are a type of coastal habitat.

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.

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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.

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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)

Q13.

Moose are animals that eat grass.

Figure 1 shows a moose.

Figure 1

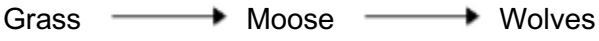


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Figure 2 shows a food chain.

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

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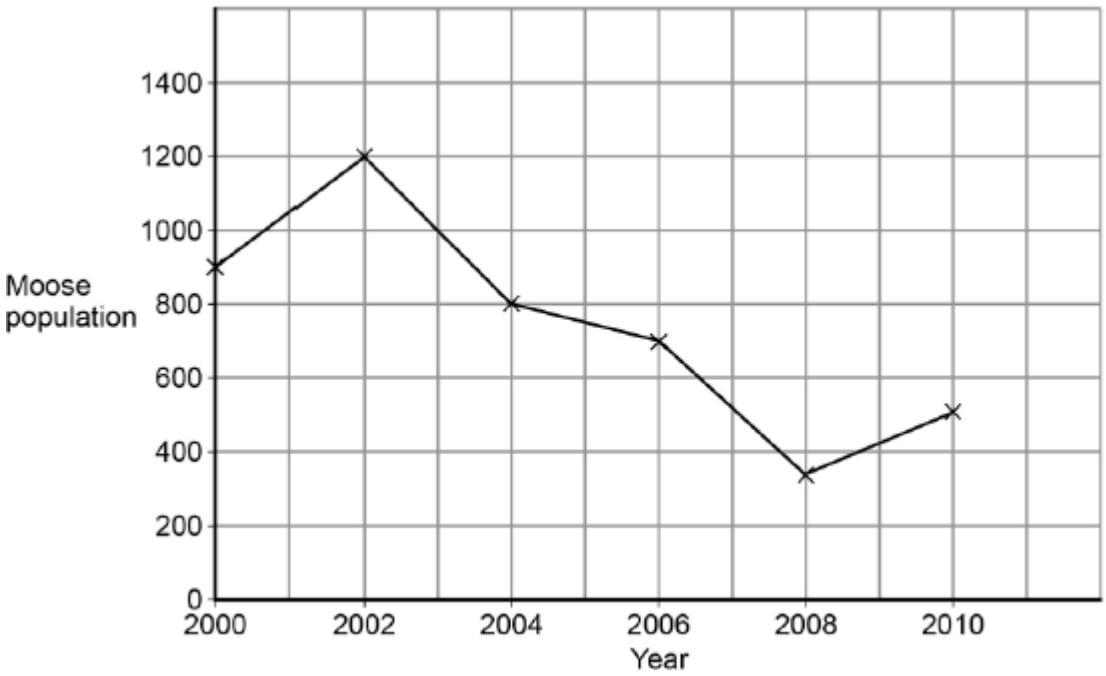
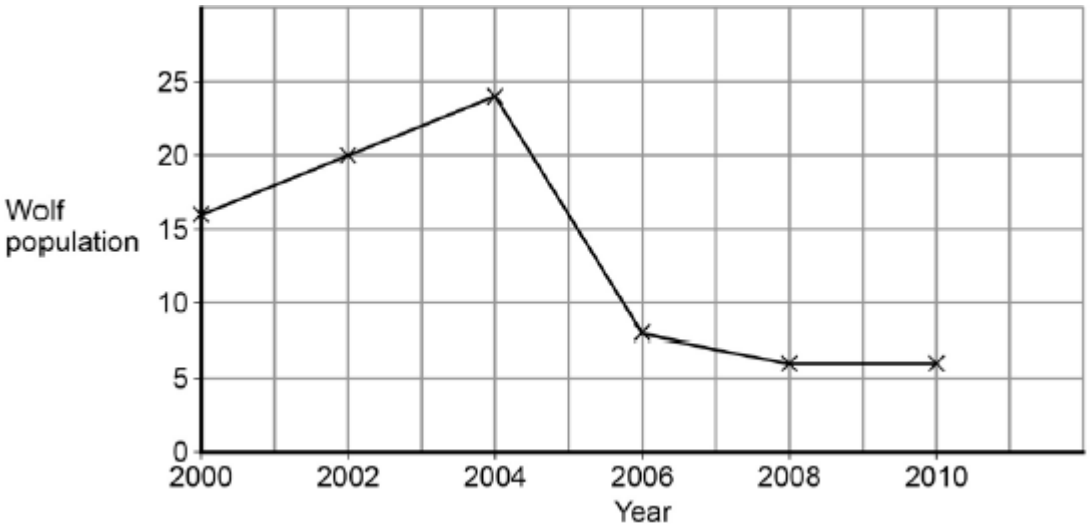


Figure 4



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.

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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)

Q14.

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.

_____

_____

_____

_____

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(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)

Q15.

Moose are animals that eat grass.

Figure 1 shows a moose.

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Figure 1



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Figure 2 shows a food chain.

Figure 2

Grass → Moose → Wolves

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

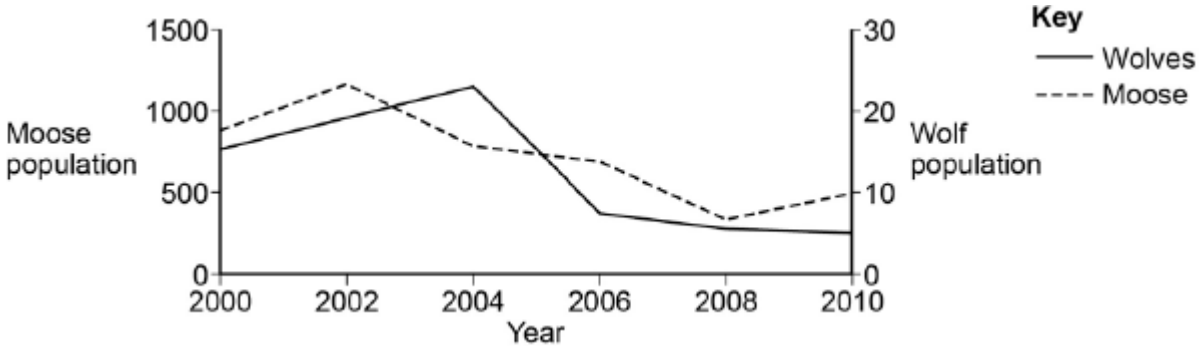
_____

(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)

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(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.

_____

_____

_____

_____

_____

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_____

_____

(5)

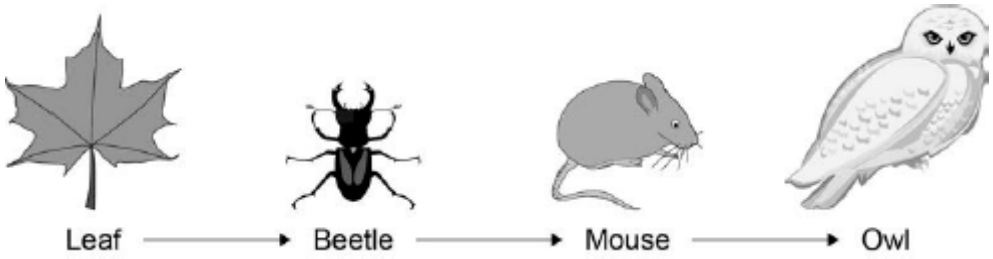
(Total 10 marks)

Q16.

Feeding relationships can be shown using food chains.

The figure below shows a food chain for organisms in a habitat.

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(a) What is the **producer** in the food chain?

Tick **one** box.

Beetle ☐

Leaf ☐

Mouse ☐

Owl ☐

(1)

(b) Name the **primary consumer** in the food chain.

_____

(1)

(c) What is the group of leaves, beetles, mice and owls in a habitat called?

Tick **one** box.

Community ☐

Ecosystem ☐

Population ☐

Species ☐

(1)

(d) What are two **abiotic** factors that can affect the food chain?

Tick **two** boxes.

Availability of food ☐

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Light intensity ☐

New diseases ☐

New predators ☐

Wind direction ☐

(2)
(Total 5 marks)

Q118.

(a) Animals have adaptations which help them to survive in their habitat.

The pictures show adaptations of three animals.

Draw **one** line from each animal to how the labelled adaptation helps the animal to survive.

Animal	How the labelled adaptation helps the animal to survive
Thick fur  © Moodboard/Thinkstock	Deters predators
Warning colours  © Ameng Wu/iStock/Thinkstock	For insulation
Large ears  © EcoPic/iStock/Thinkstock	For camouflage
	Increases heat loss

(3)

(b) All organisms compete for resources to survive.

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Give **two** resources animals compete for.

1. _____

2. _____

(2)

(Total 5 marks)

Q119.

(a) (i) Darwin's theory of evolution states that all species of living things have evolved from simple life forms.

Draw a ring around the correct answer to complete the sentence.

Simple life forms first developed on Earth more than

3 thousand years ago. **3 million years ago.** **3 billion years ago.**

(1)

(ii) Darwin's theory of evolution was not accepted when he first suggested it.

Give **one** reason why.

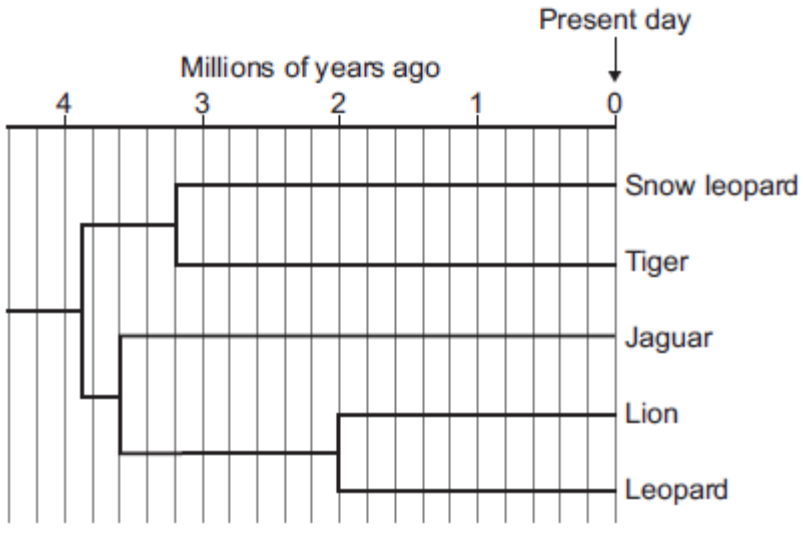
_____

_____

(1)

(b) **Figure 1** shows an evolutionary tree for the 'big cats'.

Figure 1



(i) How long ago did the lion evolve?

_____ million years ago

(1)

(ii) Which animal is the closest relative to the tiger?

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_____

(1)

(c) **Figure 2** shows a tiger. Tigers are large, striped animals. Tigers live and hunt in grassland and forest areas of Asia. They feed on animals such as deer.

Figure 2



© Jupiterimages/PHOTOS.com/Thinkstock

Suggest how stripes help the tiger to survive in its habitat.

_____

_____

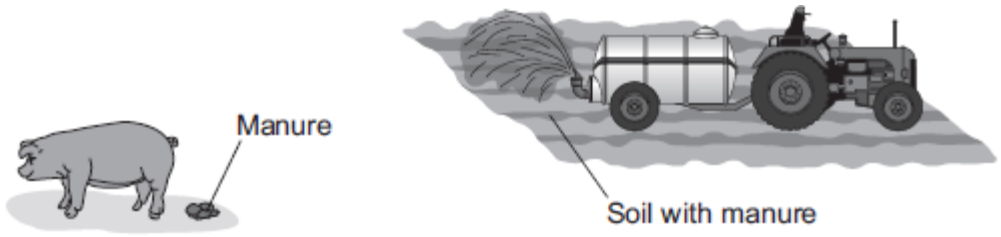
(1)

(Total 5 marks)

Q120.

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.

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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)

Q121.

A group of students did a survey to find out where woodlice were found in a garden.

Their results are shown in the table below.

Habitat	**Number of woodlice**
On top of the soil	1
Under dead, dry leaves	6
Under dead, wet leaves	15

(a) From these results, which **two** environmental conditions do woodlice prefer?

Tick (✓) **two** boxes.

Light ☐

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Dark ☐

Warm ☐

Wet ☐

Dry ☐

(2)

(b) What piece of equipment could be used to measure **one** of the environmental conditions you gave in (a)?

_____

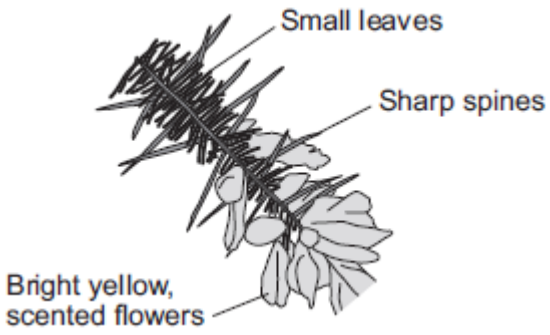
(1)

(Total 3 marks)

Q122.

The figure below shows part of a gorse plant.

Gorse is a plant that can grow in dry soils in areas where there are strong winds. Gorse plants have deep roots. The roots produce a chemical that stops the growth of seeds of other plants.



Suggest how **each** of the following adaptations helps the gorse plant to survive.

Small leaves _____

_____

_____

Deep roots _____

_____

Roots that produce a chemical that stops the growth of seeds of other plants _____

_____

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_____

(Total 3 marks)

Q123.

A group of students did a survey to find out where woodlice were found in a garden.

Their results are shown in the table.

Habitat	Number of woodlice
On top of the soil	1
Under dead, dry leaves	6
Under dead, wet leaves	15

(i) From these results, what **two** environmental conditions do woodlice prefer?

1. _____

2. _____

(2)

(ii) What piece of equipment could be used to measure **one** of the environmental conditions you gave in (i)?

_____

(1)

(iii) Suggest why the students could **not** make a valid conclusion in this investigation.

_____

_____

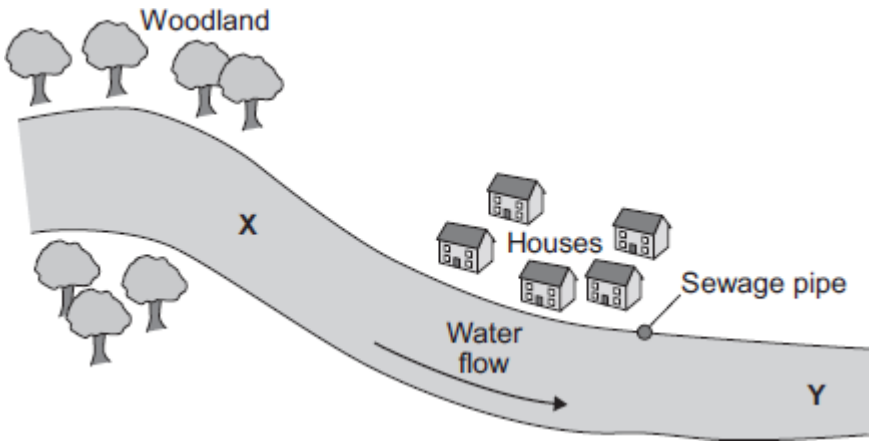
(1)

(Total 4 marks)

Q124.

Scientists investigated the water quality at points **X** and **Y** in a river. The scientists sampled the invertebrate animals living at these points.

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The table shows their results.

Invertebrate	Level of oxygen needed for survival	Number of invertebrates sampled	
		Point X	Point Y
Stonefly nymph	High	12	0
Mayfly nymph	High	11	0
Dragonfly nymph	Medium – high	5	0
Freshwater shrimp	Medium – high	14	0
Freshwater louse	Medium – low	5	6
Red-tailed maggot	Low	0	14
Tubifex worm	Low	0	15

(a) (i) How many different species of invertebrates were found in the river at point **X** and point **Y**?

Number of **different** species of invertebrates at point **X** = _____

Number of **different** species of invertebrates at point **Y** = _____

(1)

(ii) What does this suggest about the water at points **X** and **Y** in the river?

_____

_____

(1)

(b) No Dragonfly nymphs were found at point **Y** in the river.

Use information from the table to suggest why.

_____

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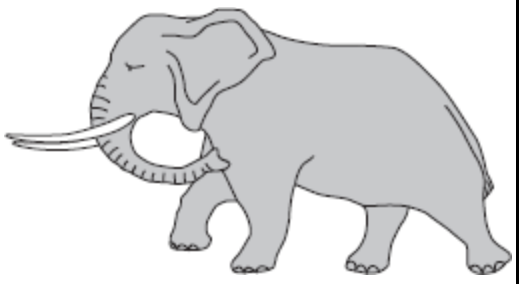
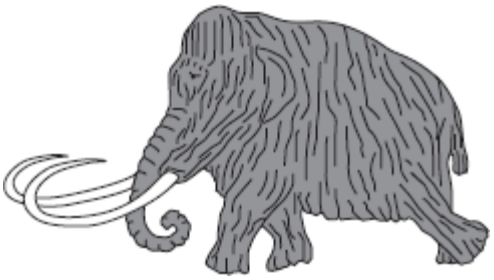
_____

(1)

(Total 3 marks)

Q125.

The table gives some information about the African elephant and the woolly mammoth.

African elephant	Woolly mammoth
	
Mass of male: 6000 kg	Mass of male: 8000 kg
Habitat: near the equator	Habitat: northern Europe
An endangered species	Extinct

(a) Use information from the table to help you to answer the following questions.

(i) The diagrams show that both animals have tusks. Tusks help animals to compete.

Suggest **two** things animals may compete for.

1. _____

2. _____

(2)

(ii) The woolly mammoth was adapted to survive during the ice age.

Use information from the table to suggest **two** ways the woolly mammoth was adapted to survive in the cold.

Adaptation 1: _____

How this helped the woolly mammoth survive: _____

_____

_____

Adaptation 2: _____

How this helped the woolly mammoth survive: _____

_____

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_____

(4)

(b) Darwin's theory of evolution says that elephants developed a trunk because animals with a longer nose had an advantage over animals with a shorter nose.

The elephants with a longer nose survived to breed and pass on the gene for a longer nose to their offspring.

(i) Name the process by which evolution happens.

_____

(1)

(ii) Describe how Lamarck's theory would explain how elephants developed a trunk.

_____

_____

_____

_____

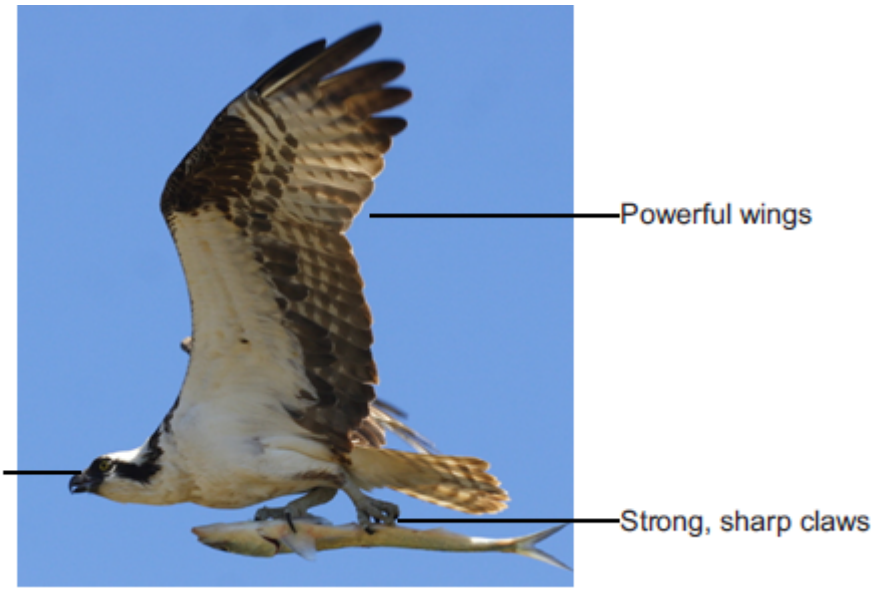
(2)

(Total 9 marks)

Q126.

The osprey is a bird of prey. It hunts and feeds on fish.

The picture shows some adaptations of the osprey.



© Henry Barbe/iStock

Describe how each adaptation helps the osprey to survive.

Good eyesight: _____

_____

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Strong, sharp claws: _____

_____

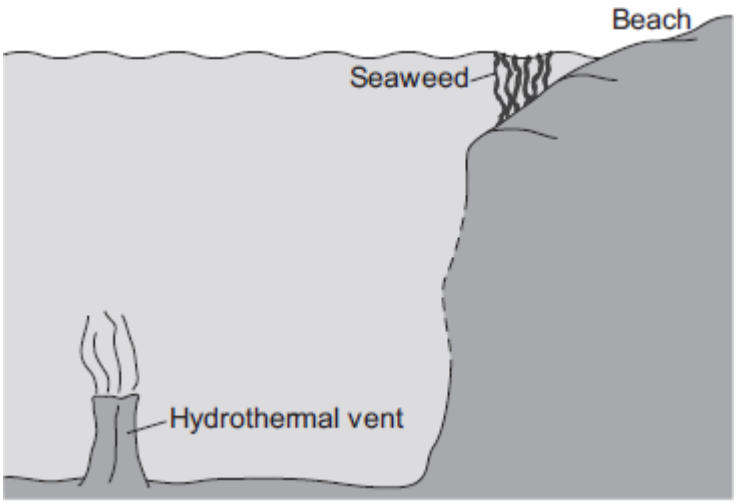
Powerful wings: _____

_____

(Total 3 marks)

Q127.

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



Not to scale

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

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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.

(6)
(Total 7 marks)

Q128.

Plants have adaptations that help them to survive.

(a) Draw **one** line from each plant in **List A** to the adaptation that helps the plant to survive in **List B**.

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List A Plant	List B How the adaptation helps the plant to survive
Azalea  Large colourful flowers with a strong scent	The plant is able to absorb lots of light
Cactus  Swollen stem	The plant prevents other plants growing too close
Fern  Releases poisons into the soil	The plant attracts insects to help it to reproduce
	The plant is able to store lots of water

Azalea: By Muffet [CC-BY-2.0] via Wikimedia Commons. Cactus: Ansel Adams [Public domain] via Wikimedia Commons.
Fern: By Phyzome (Own work) [GFDL or CC-BY-SA-3.0], via Wikimedia Commons

(3)

(b) All organisms compete for resources to survive.

Give **three** factors plants compete for.

1. _____

2. _____

3. _____

(3)

(Total 6 marks)

Q129.

Greater plantain and Ribwort plantain are two types of plant.

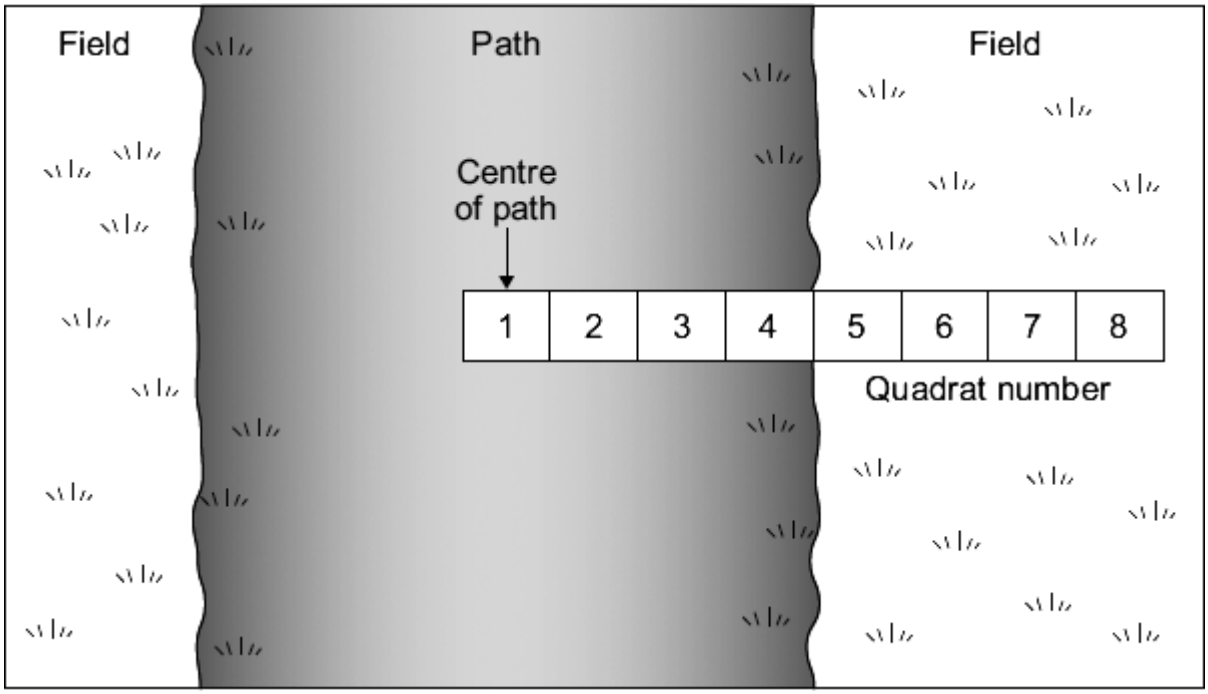
Students investigated the distribution of these two plants across a path.

The students wanted to find out how the two plants were affected when people walked

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along the path. The students used a grid called a quadrat.

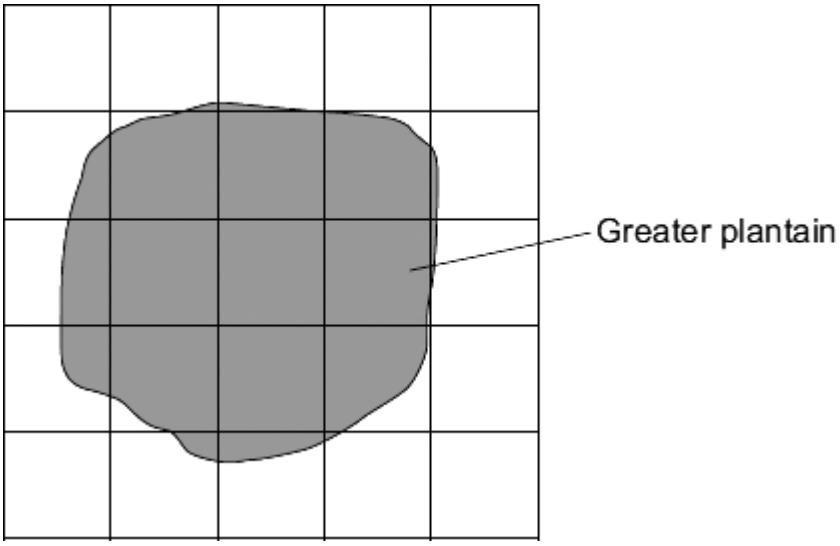
The diagram shows where the students put the quadrats.



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.



Percentage = _____

(2)

(b) The results are shown in the table.

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	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.

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

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Predict what the students would find out.

Give the reason for your prediction.

_____

_____

_____

_____

(2)

(Total 8 marks)

Q130.

The star-nosed mole is almost blind, but is a very successful predator.

The star-nosed mole tunnels underground to find its prey.



By Brandon Motz [CC-BY-2.0] via Wikimedia Commons

(a) Use information from the photograph to suggest how each of the following adaptations helps the star-nosed mole to survive.

(i) Very small eyes hidden in thick fur:

_____

_____

(1)

(ii) Strong front limbs:

_____

_____

(1)

(iii) Tentacles around nose that are very sensitive to touch:

_____

_____

(1)

(b) In a community, star-nosed moles feed on small invertebrates. The small invertebrates feed on plants.

What is the source of energy for this community of organisms?

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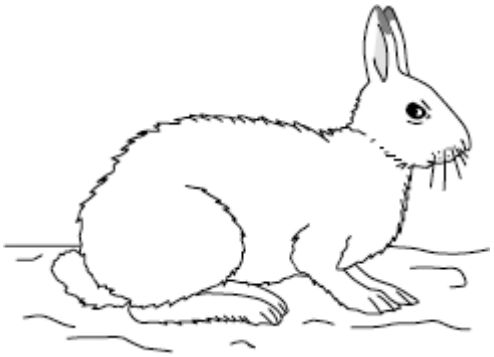
_____

(1)

(Total 4 marks)

Q131.

Arctic hares live in very cold and snowy conditions.



Suggest how each of the following adaptations helps the Arctic hare to survive.

Thick fur: _____

_____

Large feet: _____

_____

White fur: _____

_____

(Total 3 marks)

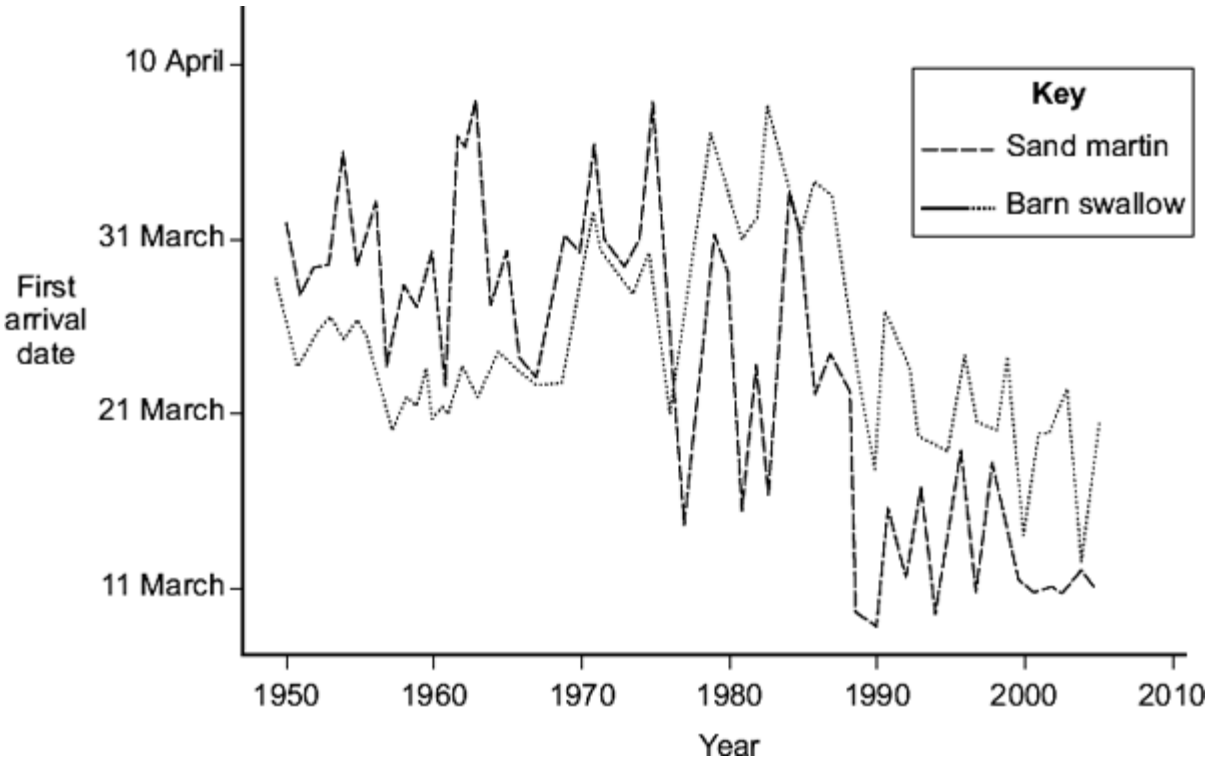
Q132.

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.

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

Tick (✓) **two** boxes.

Birds fly at faster speeds than they used to ☐

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)

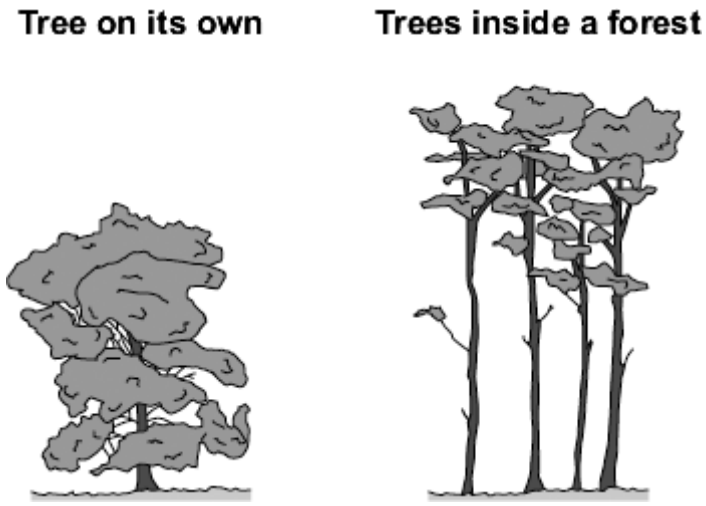
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(Total 3 marks)

Q133.

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

The drawing shows the shapes of trees growing on their own and inside a forest.
The trees are of the same species.



Describe the differences between the tree growing on its own and the trees inside the forest.

Suggest reasons for the differences you have described.

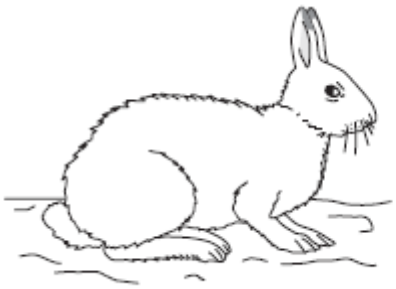
(Total 6 marks)

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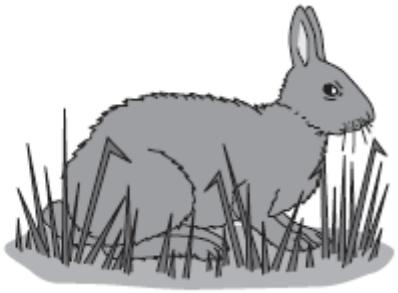
Q134.

Arctic hares live in very cold conditions.

Arctic hare in winter coat



Arctic hare in summer coat



Explain in detail how each of the following adaptations helps the Arctic hare to survive.

(a) The Arctic hare has a white coat in winter and a darker coat in summer:

_____

_____

_____

_____

(2)

(b) The Arctic hare has smaller ears than the European hare:

_____

_____

_____

_____

(2)

(Total 4 marks)

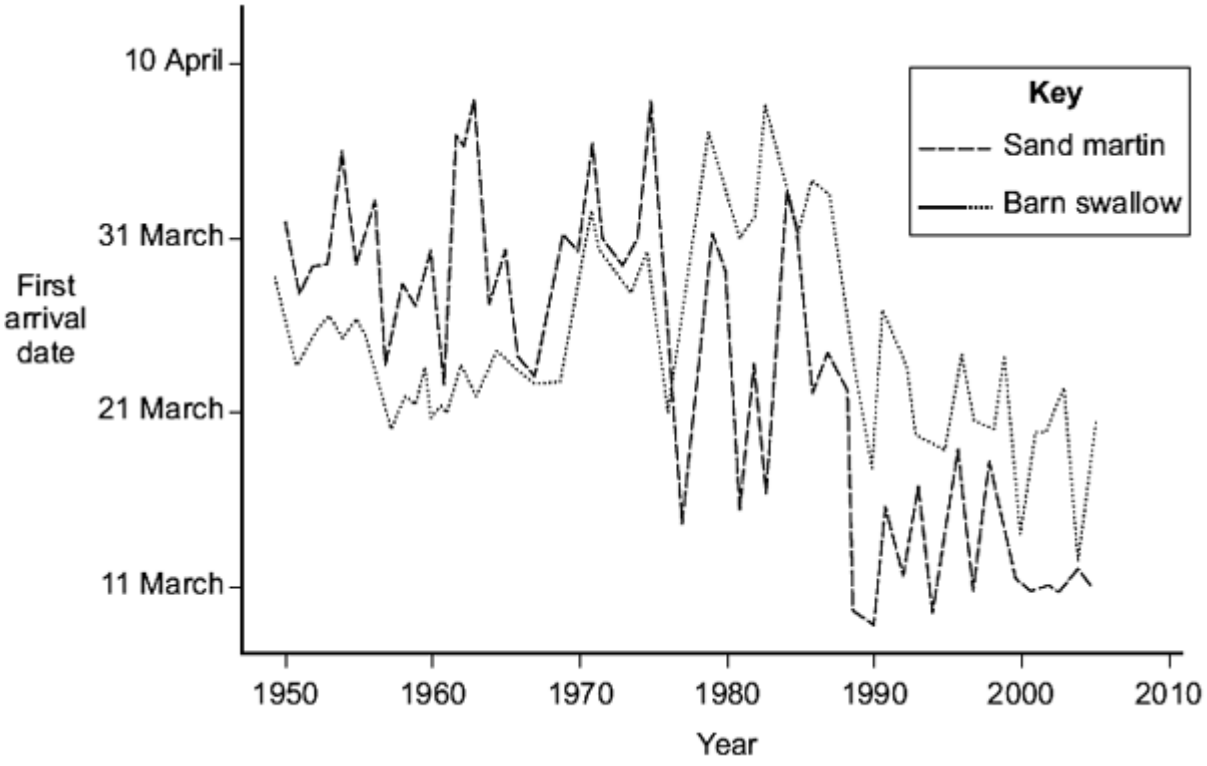
Q135.

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.

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(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)

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