4.7 Ecology Foundation

Name: _____

Class: _____

Date: _____

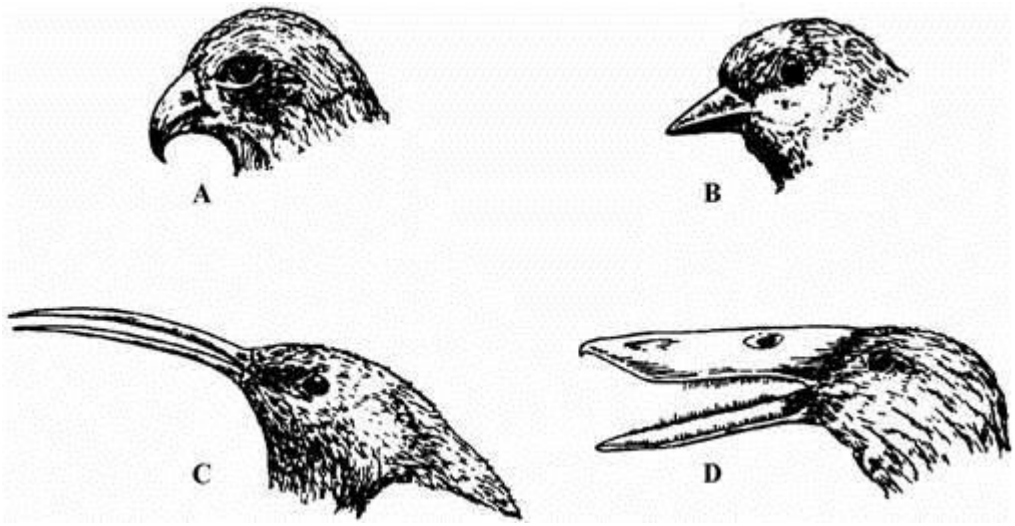
Time: **305 minutes**

Marks: **305 marks**

Comments:

Q1.

The drawings show the heads of four birds, not drawn to scale. The birds feed in different ways.



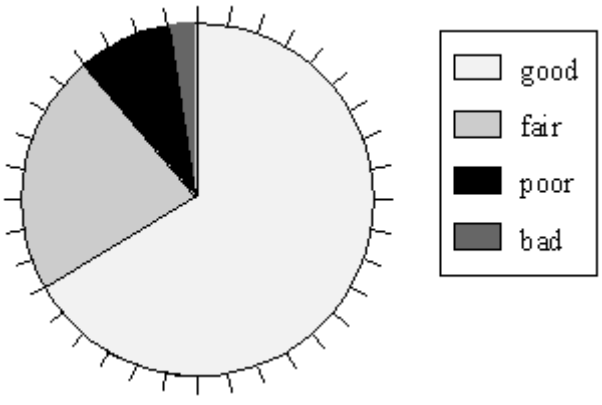
Which of the birds, A, B, C or D, is best adapted for:

1. tearing flesh _____
2. finding insects in cracks in the ground _____
3. crushing fruit _____
4. sieving small animals from mud? _____

(Total 4 marks)

Q2.

The pie diagram shows the quality of river water in England and Wales in 1985.



(a) What proportion of the rivers had good quality water?

_____

(1)

(b) Give **two** ways in which rivers may become polluted.

1. _____

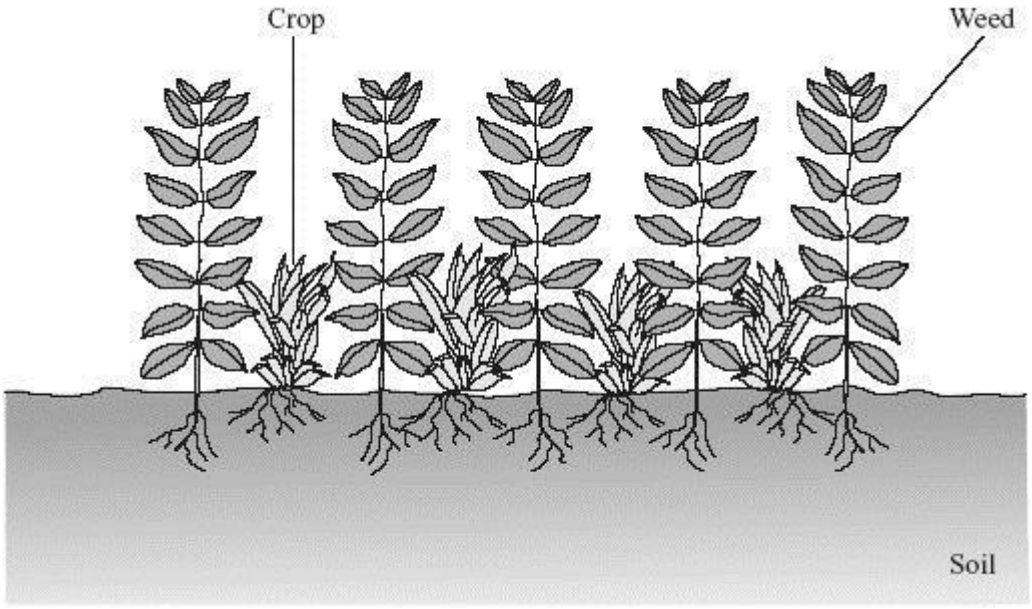
2. _____

(2)

(Total 3 marks)

Q3.

Farmers need to get rid of weeds because they can stop crops growing well.



(a) Write down **three** things that crops and weeds compete for.

1. _____

2. _____

3. _____

(3)

(b) Complete this sentence by crossing out the **two** words that are wrong in the box.

Chemicals that are used to kill weeds are called

fertilisers
herbicides
pesticides

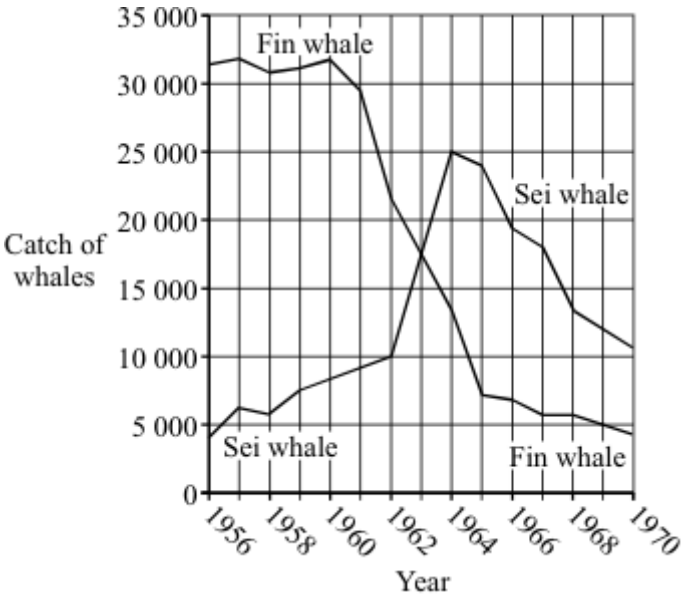
.

(1)

(Total 4 marks)

Q4.

During the last hundred years many species of whales have been over-hunted. This has led to a dramatic decrease in their numbers. The graph shows the catches of two of these species, Fin whales and Sei whales, between 1956 and 1970.



(a) When did over-hunting begin to affect the Fin whale population?

_____

(1)

(b) Complete the sentence.

When a species is over-hunted many adults are killed. The population numbers fall dramatically because the death rate is far greater than the

_____

(1)

(c) (i) In what **year** were the catches of Fin whales and Sei whales the same?

_____

(1)

(ii) Between 1963 and 1964 how did the catches of Fin whales and Sei whales alter?

Fin whales _____

Sei whales _____

(1)

(d) Suggest why the catches of Sei whales increased between 1956 and 1964.

_____

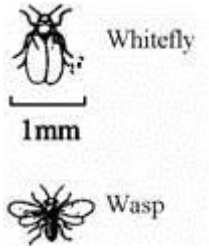
_____

(1)

(Total 5 marks)

Q5.

Whitefly are pests and harm plants in glasshouses.
A small wasp can be used to control the whitefly.



The wasp can only lay its eggs in the larvae of whiteflies.
The wasp larva eats the body of the whitefly larva.
It then changes into a new wasp and flies off.

(a) Choose words from the list to complete the sentences below.

decomposer **predator** **prey** **producer**

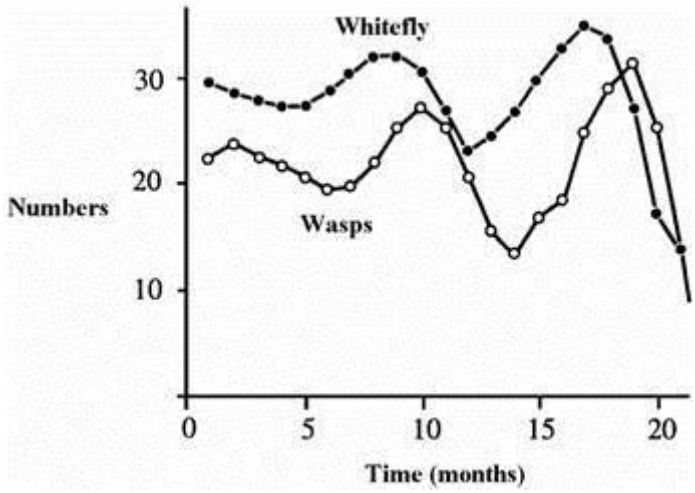
The wasp larva feeds on the whitefly larva.

The wasp is a _____

The whitefly is known as the wasp's _____

(2)

(b) The graph shows how the numbers of whitefly and wasps change over several months.



What happens to the number of wasps between 15 and 20 months?

_____

Why do you think this happens? _____

_____

_____

_____

(4)

(c) What would happen to the wasps if there were no larvae in which to lay their eggs?

_____

(1)

(Total 7 marks)

Q6.

The diagrams show maize plants grown from seeds sown at different distances from each other.

(a) Write down **two** differences you can see between plants A and B.

1. _____

_____

2. _____

_____

(2)

(b) The differences are caused by competition between the maize plants.

The maize plants are competing for **light**. The maize plants are also

competing for _____

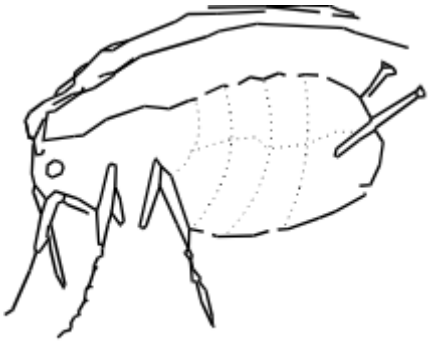
and _____

(2)

(Total 4 marks)

Q7.

The greenfly is an insect which is eaten by ladybirds.



Greenfly

(a) (i) What do we call animals, like the ladybird, which hunt and kill other animals for food?

_____

(1)

(ii) What do we call animals, like the greenfly, which are eaten by other animals?

_____

(1)

(b) What would happen to the number of ladybirds if the numbers of greenfly suddenly dropped?

_____

(1)

Give a reason for your answer.

_____

_____

(1)

(c) Suggest **two** factors, other than the number of ladybirds, which could affect the number of greenfly.

1. _____

2. _____

(2)

(Total 6 marks)

Q8.

Tree on its own

Trees inside a wood

The drawing above shows the shapes of trees grown on their own and inside a wood.

(a) Write down **two** differences you can see between the tree grown on its own and those growing inside a wood

1. _____

_____

2. _____

_____

(2)

(b) Trees inside the wood have to compete with each other for the things which they need to grow.

List **three** things for which the trees compete.

1. _____

2. _____

3. _____

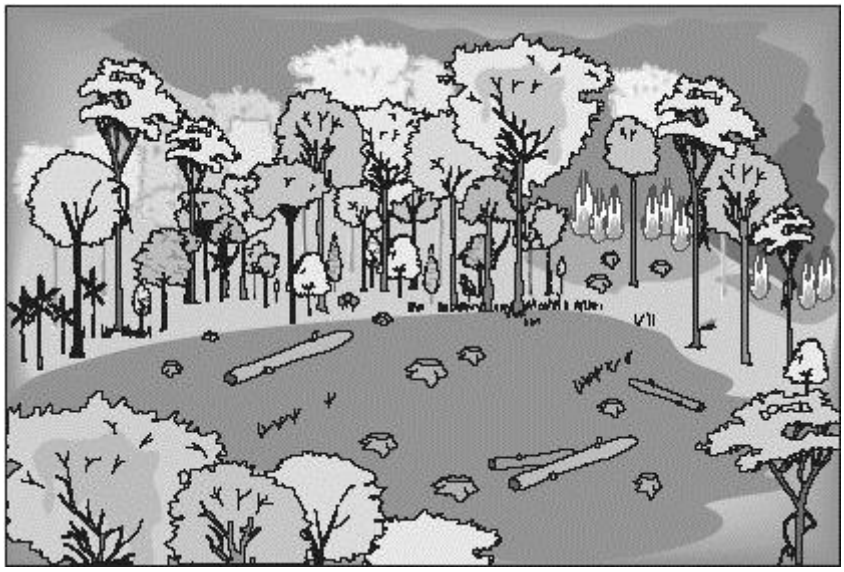
(3)

(Total 5 marks)

Q9.

The picture shows a forest being cleared so that rice can be grown.

The trees are chopped down and then burned.



(a) Complete the sentences by using the correct words from the box

acid rain	**carbon dioxide**	**the greenhouse effect methane dioxide**	**sulphur**

Burning trees give off the gas _____ .

The rice crop will increase the amount of the gas _____ in the atmosphere.

These two gases help to cause _____ .

(3)

(b) Burning fossil fuels also causes pollution.

Name **one** fossil fuel.

_____

(1)

(Total 4 marks)

Q10.

Camels can live in hot deserts.

Read the following information.

- A camel has big, flat feet.
- A camel's hump is where fat is stored.
- The fat from a camel's hump can be broken down to form carbon dioxide and water.
- A camel has no layer of fat under the skin.
- A camel can go at least two weeks without water.
- A camel can drink large amounts of water in one go.
- A camel has long eyelashes and long hair around the openings to its ears.

(a) Give **one** way that the camel is well adapted to living where there is sand.

_____

(1)

(b) Suggest why the camel does **not** need a layer of fat under its skin.

_____

(1)

(c) Give **two** reasons why the camel can go at least two weeks without drinking any water.

1. _____

_____

2. _____

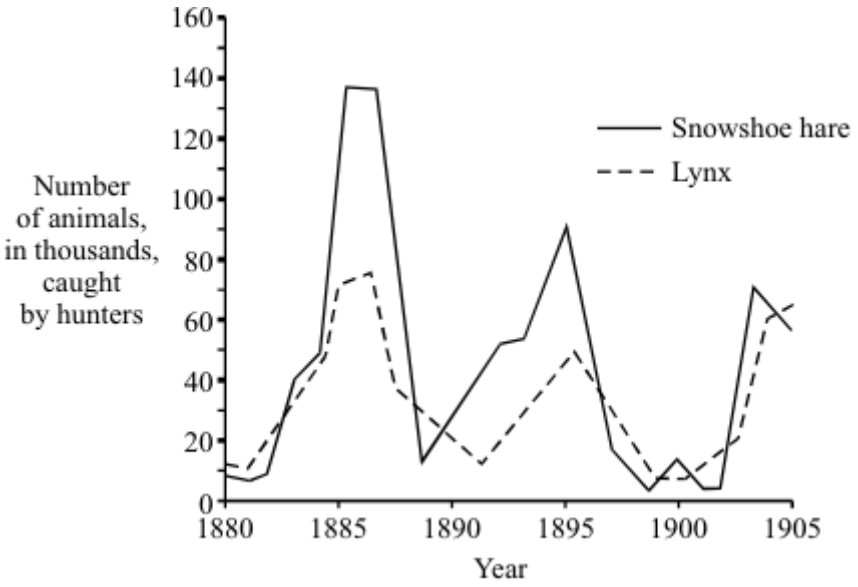
_____

(2)

(Total 4 marks)

Q11.

The graphs give information, from a hundred years ago, about the size of the population of snowshoe hares and lynx, which live in northern Canada. Snowshoe hares are herbivores. Lynx are carnivores and prey on snowshoe hares.



(a) Give **three** factors which can affect the size of the snowshoe hare population.

1. _____

2. _____

3. _____

(3)

(b) The graph for numbers of lynx shows a similar cycle to that of the snowshoe hares. The peaks for lynx usually occur about a year later than the peaks for the snowshoe hares. Suggest why.

_____

_____

_____

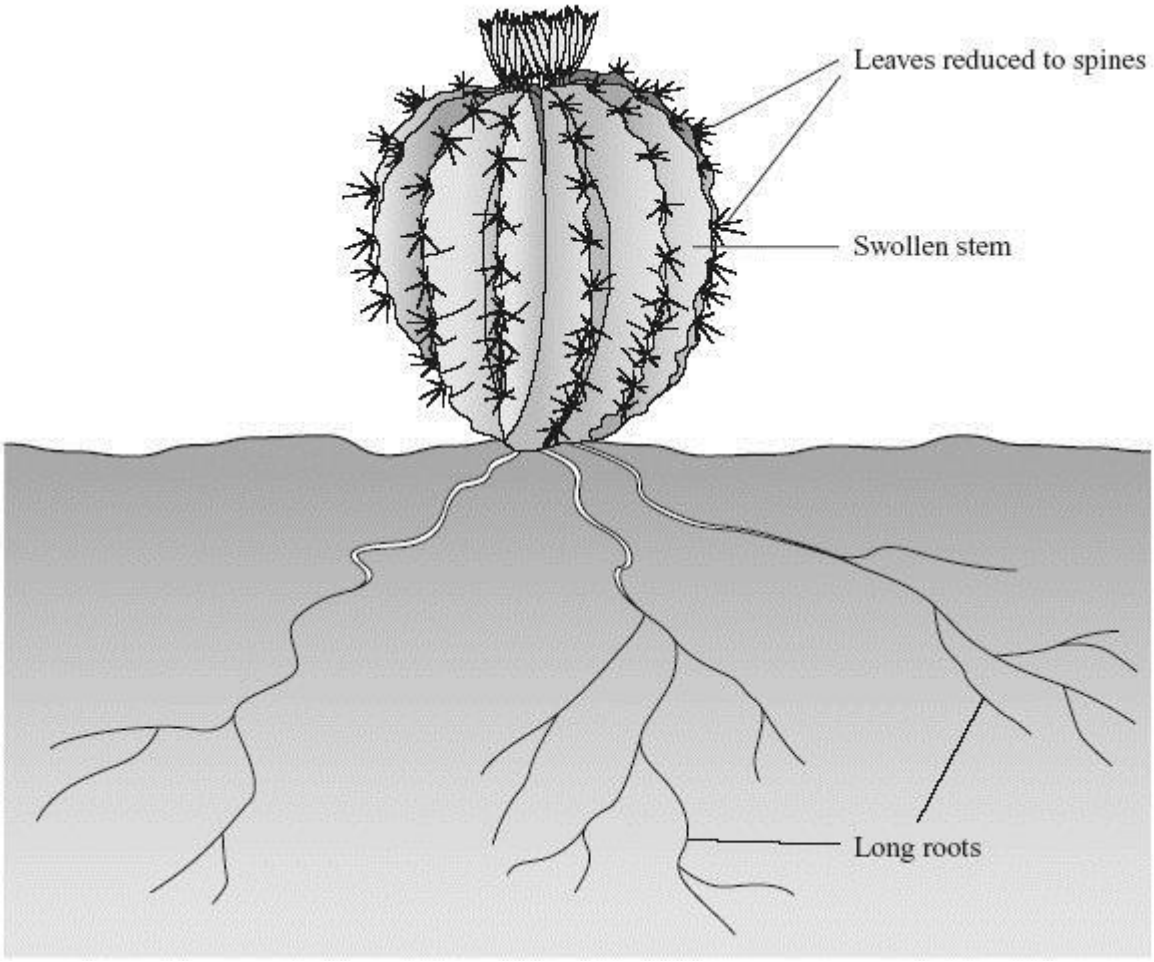
_____

(2)

(Total 5 marks)

Q12.

The drawing shows a plant that is adapted to life in a hot, dry desert.



(a) Which labelled part of the plant helps it to get the water it needs?

_____

_____

(1)

(b) The stem of the plant is covered by wax.
How does this help the plant to survive?

_____

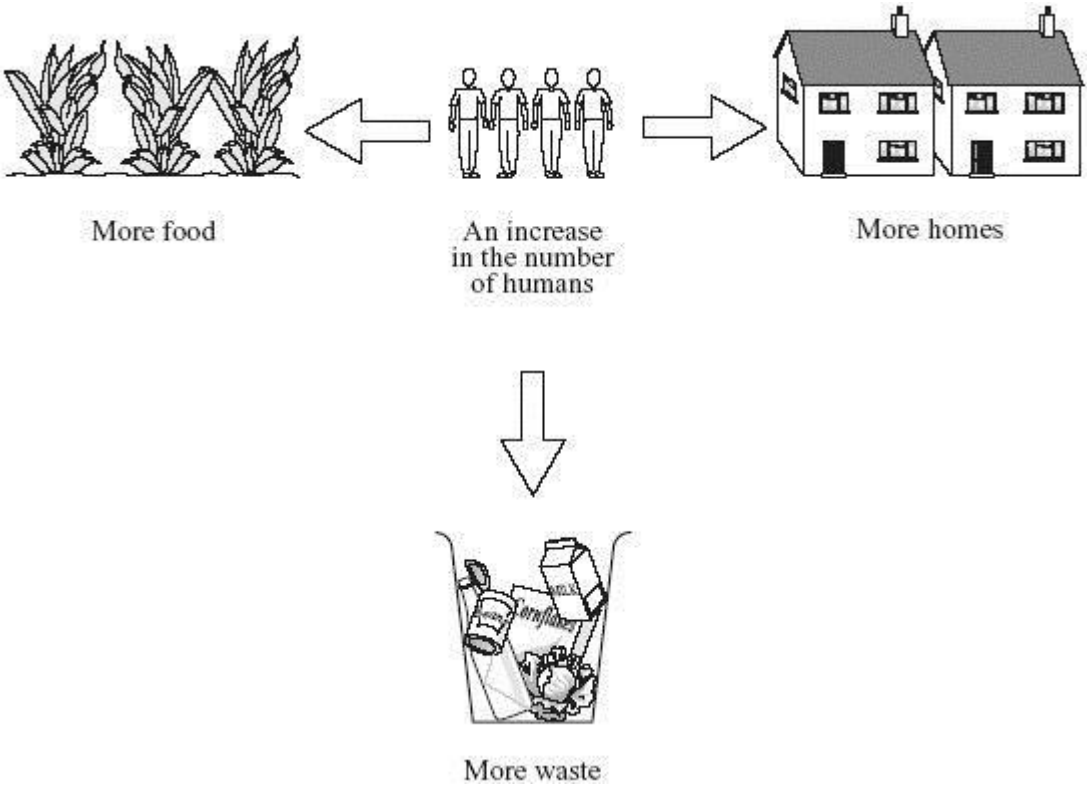
_____

(1)

(Total 2 marks)

Q13.

The population of humans is rising. The diagram shows ways in which this affects the environment.



Humans reduce the amount of land available for other animals and plants. Use information from the diagram to state **three** ways in which this happens.

1. _____

_____

2. _____

_____

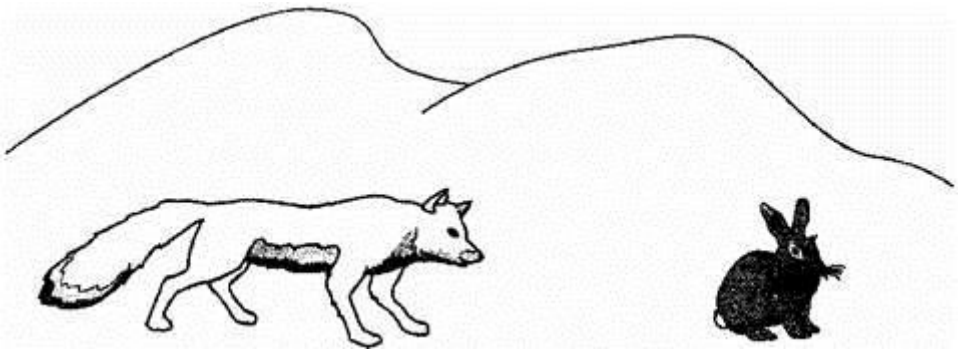
3. _____

_____

(Total 3 marks)

Q14.

The Arctic fox is a predator that feeds mainly on small mammals. The Arctic fox is adapted to live in the cold conditions of the snow-covered Arctic.



The Arctic fox has thick, white fur.

Give **two** ways in which the fur helps the Arctic fox to survive.

1. _____

_____

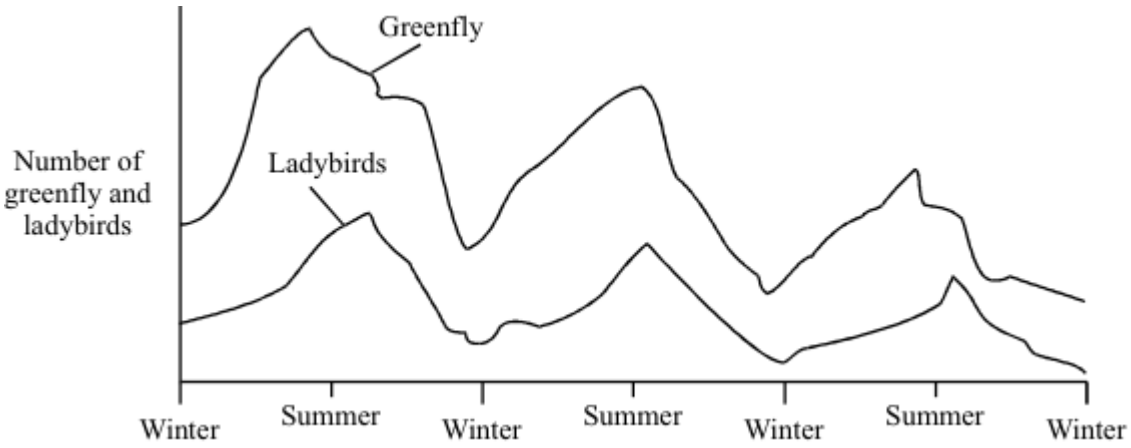
2. _____

_____

(Total 2 marks)

Q15.

Greenfly feed on rose bushes. Ladybirds (predators) feed on these greenfly. The graph shows how the population of greenfly and ladybirds in a garden change over a period of three years.



(a) *To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.*

Describe what happened to the population of greenfly over the three years.

_____

_____

_____

_____

_____

_____

_____

_____

(3)

(b) Give **one** factor that limits the number of ladybirds.

_____

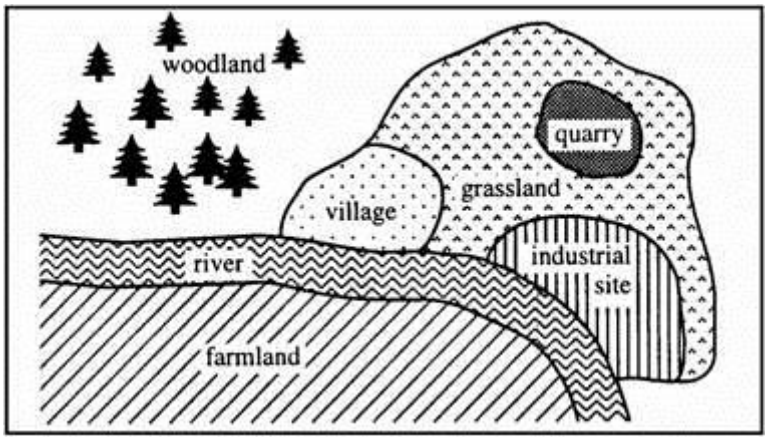
_____

(1)

(Total 4 marks)

Q16.

The diagram shows a village and its surroundings.



(a) Use words from the list to complete the sentences about pollution.

oxygen **pesticides** **sewage** **sulphur dioxide**

The air might be polluted by _____ from the industrial site.

The river might be polluted by _____ from the village and

by _____ from the farmland.

(3)

(b) The owners of the quarry want to make it larger.

Give **one** effect that this might have on wild plants and animals that live near the quarry.

_____

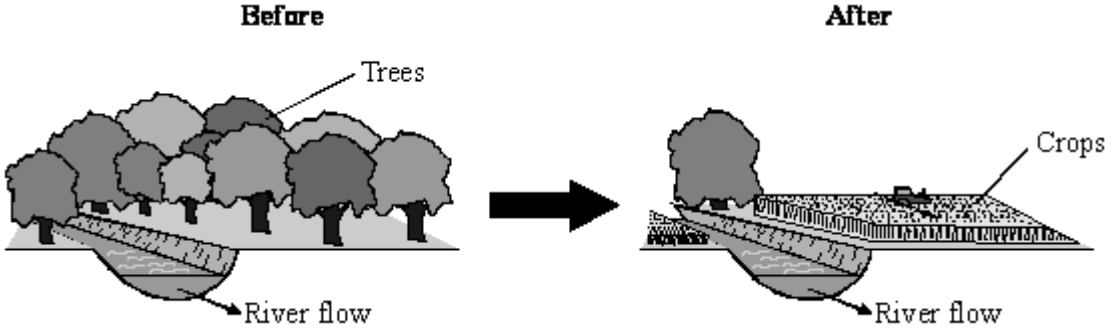
_____

(1)

(Total 4 marks)

Q17.

In many countries, trees are removed so that more land can be used to grow crops.



(a) When trees are removed it becomes more difficult for some plants and animals to survive. Give **one** reason why.

_____

_____

(1)

(b) Farmers often spread chemicals on their fields before growing crops.
When the crops are growing, the farmers sometimes spray them with toxic chemicals.
These chemicals may be washed from the fields and can pollute the rivers.

Name **two** types of these chemicals that might pollute rivers.

1. _____

2. _____

(2)

(Total 3 marks)

Q18.

The drawing shows a poison-dart frog.

(a) The poison-dart frog moves mainly by jumping.

Use information from the drawing to suggest **one** way in which this frog is adapted for jumping.

_____

_____

(1)

(b) Use the information below to suggest how the poison-dart frog is adapted for survival.

- This poison-dart frog is bright blue in colour.
- Animals that eat poison-dart frogs become very sick.

_____

_____

(1)

(Total 2 marks)

Q19.

Animals and plants are adapted in different ways in order to survive.

(a) Plants may have to compete with other plants.

(i) Name **two** things for which plants compete.

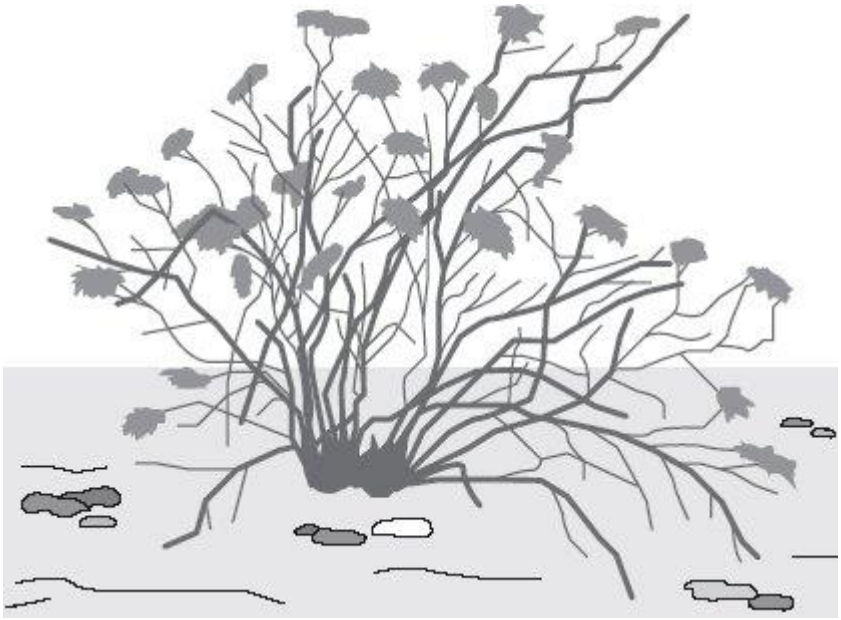
1. _____

2. _____

(2)

(ii) The drawing shows a creosote bush.

This bush lives in a desert.



The creosote bush produces a poison that kills the roots of other plants.

How does this poison help the creosote bush to survive in the desert?

_____

_____

(1)

(b) The photograph shows an insect called a katydid.

The katydid is preyed on by birds.

How does the appearance of the katydid help it to survive?

_____

_____

_____

_____

(1)

(Total 4 marks)

Q20.

Animals and plants are adapted to live in their environment.

(a) Explain how these adaptations help animals keep warm in cold conditions.

(i) A thick fur coat

_____

_____

(2)

(ii) A thick layer of fat beneath the skin

_____

_____

(2)

(iii) A large body

_____

_____

(2)

(b) Lots of animals are *camouflaged.* What does *camouflaged* mean? Give **one** advantage of being *camouflaged.*

_____

_____

_____

(2)

(c) Describe **two** different ways that plants could be adapted to survive in dry conditions like a desert.

_____

_____

_____

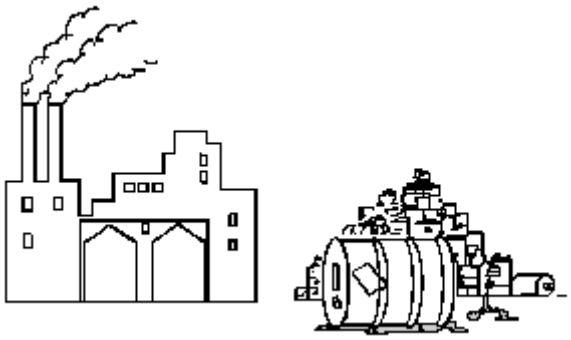
_____

(2)

(Total 10 marks)

Q21.

The drawings below show some of the effects that human activities have on the environment.



Use information from the drawings to give **two** ways in which these human activities affect other living organisms.

1. _____

_____

_____

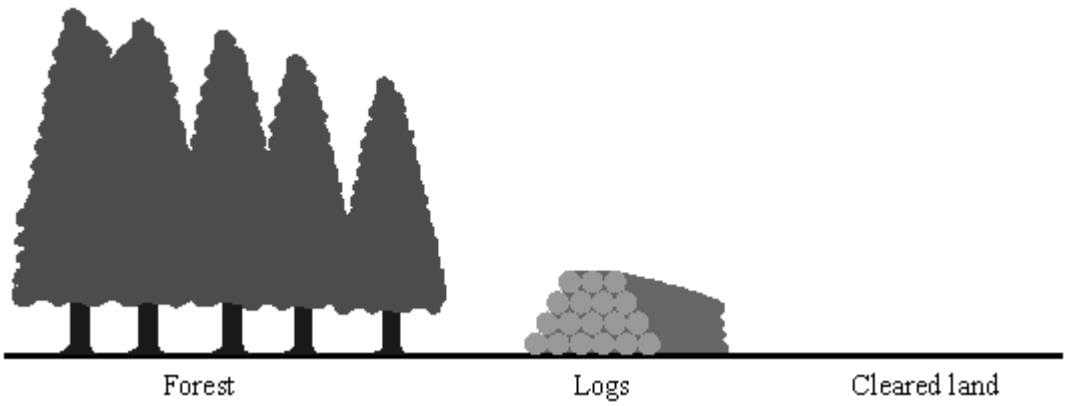
2. _____

_____

_____

(Total 2 marks)

Q22.



Some large forest areas are being destroyed. This changes the amount of carbon dioxide in the atmosphere.

(a) (i) State **one** use for the trees that are cut down.

_____

(1)

(ii) State **one** use for the cleared land.

_____

(1)

(iii) How has the destruction of forests affected the amount of carbon dioxide in the atmosphere?

_____

(1)

(b) (i) How has the destruction of forests caused an increased Greenhouse effect?

_____

_____

_____

_____

_____

_____

_____

(4)

(ii) State **one** effect of an increase in the Greenhouse effect.

_____

_____

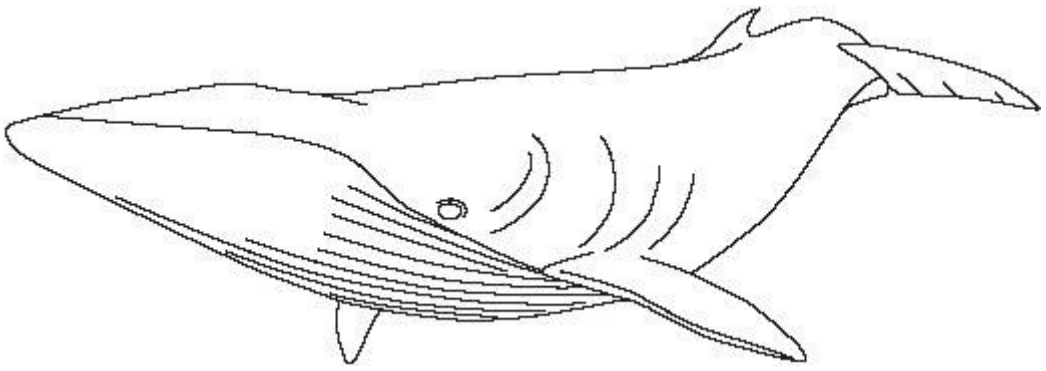
(1)

(Total 8 marks)

Q23.

(a) **Figure 1** shows a minke whale. Whales live in the sea.

Figure 1



Write down **two** ways in which the body of the whale is adapted for swimming.

1. _____

_____

2. _____

_____

(2)

(b) **Figure 2** shows the skeleton of a minke whale.

Figure 2

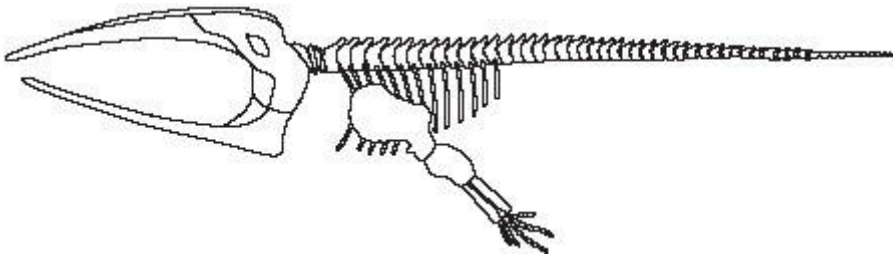
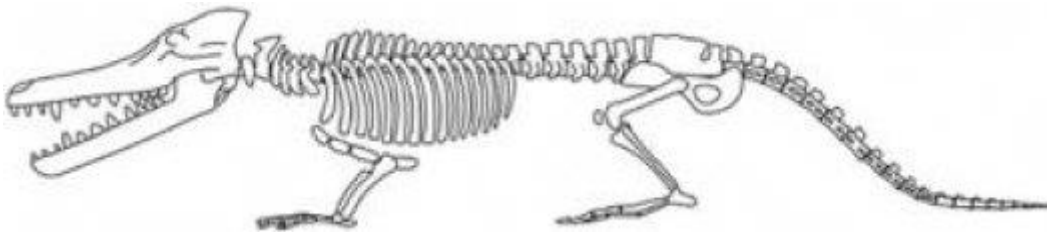


Figure 3 shows the fossil skeleton of an extinct whale.

Figure 3



Hans G Thewissen/ The Thewissen Lab

(i) Apart from size, give **two** differences between the skeleton of the minke whale and the fossil skeleton of the extinct whale.

1. _____

_____

2. _____

_____

(2)

(ii) In each of the sentences below, draw a ring around the correct answer.

Life on Earth first developed more than three

billion
million
thousand

years ago.

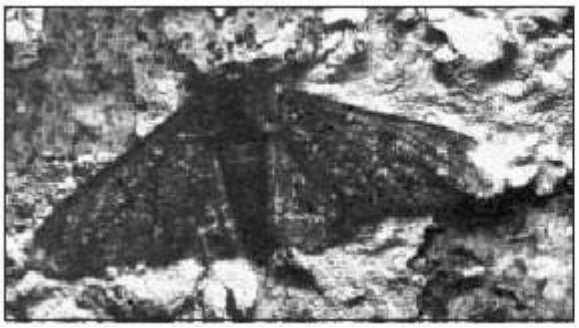
Fossils	disprove give evidence for prove	the theory of evolution.

(2)

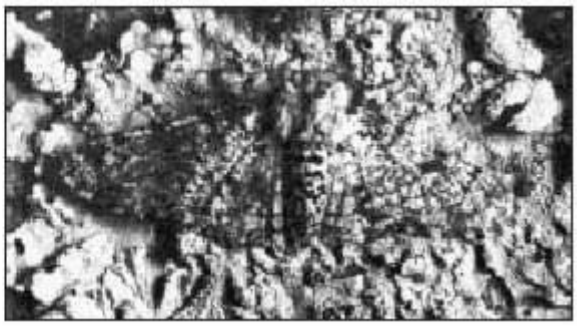
(Total 6 marks)

Q24.

The photographs show two varieties of moths, **X**and **Y**. The moths belong to the same species.
The moths are resting on a tree trunk in open countryside.



Moth **X**



Moth **Y**

(a) Which variety of moth, **X** or **Y**, is more likely to be killed by insect-eating birds? Give a reason for your answer.

Variety of moth: _____

Reason _____

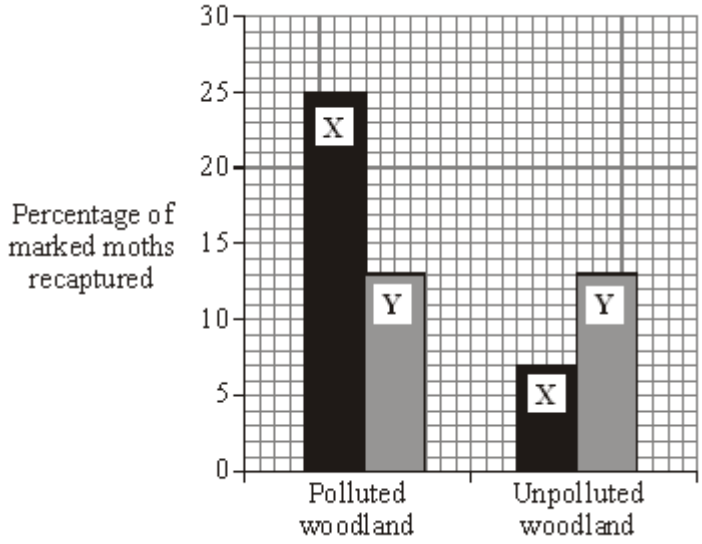
_____

(1)

(b) In an experiment, large numbers of each variety of moth were caught in a trap.

- They were marked with a spot of paint on the underside of one wing and then released.
- A few days later, moths were again trapped and the number of marked moths was counted.
- The experiment was carried out in a woodland polluted by smoke and soot, and also in an unpolluted woodland.

The results are shown in the bar graph.



(i) When the moths were being marked, suggest why the paint was put on the underside of the wing and not on the top.

_____

(1)

(ii) What percentage of moths of type **X** was recaptured in:

the polluted woodland; _____

the unpolluted woodland? _____

(2)

(iii) In each woodland, only a small number of marked moths of both varieties were recaptured. Suggest **one** reason for this.

_____

_____

(1)

(c) (i) The colour of the moths is controlled by a gene. The dark form was first produced by a mutation in the gene.

What chemical, found in a gene, is changed by a mutation? Draw a ring around your answer.

carbohydrate **DNA** **fat** **protein**

(1)

(ii) Some of the offspring from the original dark moth were also dark. What caused this?

_____

_____

(1)

(Total 7 marks)

Q25.

In recent years, trees have been cut down to create more farm land. More cattle are kept and more rice is grown.

(a) (i) Which gas has increased in the air as a result of trees being cut down?

Draw a ring around **one** answer.

carbon dioxide **oxygen** **sulphur dioxide**

(1)

(ii) Which gas has increased in the air as a result of keeping more cattle and growing more rice?

Draw a ring around **one** answer.

carbon monoxide **hydrogen** **methane**

(1)

(b) What effect may increases in these gases have on global temperatures?

Draw a ring around **one** answer.

decrease **increase** **stay the same**

(1)

(c) List **three** ways in which humans have destroyed the habitats of other animals. Do **not** include cutting down trees in your answer.

1. _____

_____

2. _____

_____

3. _____

_____

(3)

(Total 6 marks)

Q26.

A selective herbicide (a type of pesticide) can be used to kill weeds growing among crop plants.

The table shows the result of adding different amounts of a selective herbicide to a rice crop.

Herbicide added in kg per hectare	Amount of rice produced in tonnes per hectare	Percentage cover of weeds
0.0	50	85
1.7	70	32

3.4	76	24

(a) As more herbicide is applied, what happens to:

(i) the amount of rice produced;

_____

(1)

(ii) the percentage cover of weeds?

_____

(1)

(b) Suggest **two** reasons why rice does not grow well when there are a lot of weeds present.

1. _____

_____

2. _____

_____

(2)

(c) Suggest **one** possible danger of spraying crops with pesticides.

_____

_____

(1)

(Total 5 marks)

Q27.

The table compares some features of a polar bear and the Malayan sun bear. The polar bear lives in the Arctic where the climate is cold. The Malayan sun bear lives in warm tropical forests.

	Polar bear	**Malayan sun bear**
Colour of fur	White	Black
Thickness of fur in cm	5	2
Thickness of fat layer under skin in cm	11	1
Surface area compared to body size	Low	High

Use information from the table to explain how the polar bear is better adapted than the Malayan sun bear for survival in arctic conditions.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

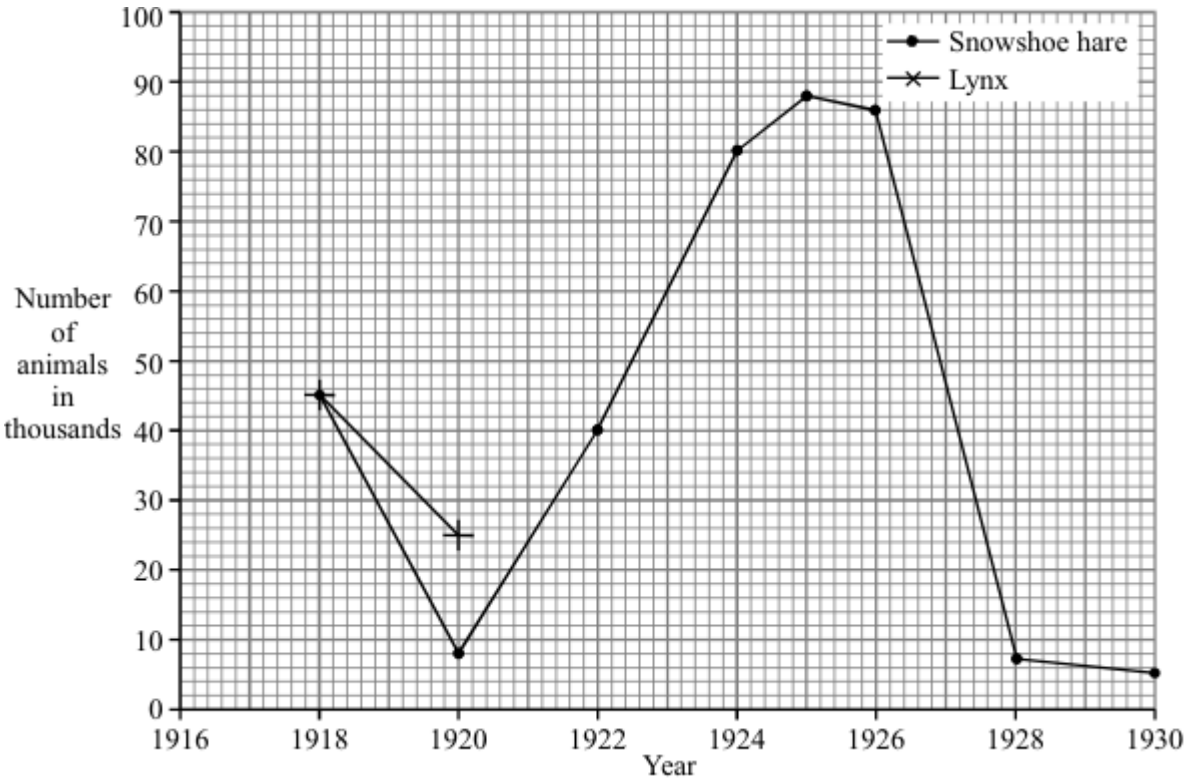
(Total 5 marks)

Q28.

The lynx is a wild cat which lives in Canada. The table shows the number of lynx trapped in a part of Canada in certain years.

Year	Number of lynx in thousands
1918	45
1920	25
1922	10
1924	20
1926	40
1928	50

The snowshoe hare is another wild animal found in Canada. The graph shows the number of snowshoe hares trapped in the same years. The lynx eats the snowshoe hare.



(a) Draw a graph of the data in the table. The first two points have been plotted for you.

(2)

(b) From your graph, predict how many lynx were trapped in 1925.

_____ thousand

(1)

(c) Use the information to answer the following.

(i) What would you expect to happen to the number of lynx trapped in 1930? Draw a ring around your answer.

rise **fall** **stay the same**

(1)

(ii) Give a reason for your answer to part (c)(i).

_____

_____

(1)

(d) The lynx is a predator. What is a predator?

_____

_____

(1)

(Total 6 marks)

Q29.

The drawing shows a kangaroo rat.

This rat lives in hot, dry deserts.

(a) Explain how each of the following features helps the kangaroo rat to survive in a hot, dry desert.

(i) It does not produce urine.

_____

_____

(1)

(ii) It lives in a burrow during the day, but comes out at night to search for food.

_____

_____

(1)

(iii) Its feet and its tail each have a large surface area.

_____

_____

(1)

(b) The kangaroo rat does **not** sweat.

Explain why **not** sweating could be dangerous for the animal.

_____

_____

(1)

(Total 4 marks)

Q30.

Moose are animals that eat grass.

Figure 1 shows a moose.

Figure 1

© Wildnerdpix/iStock/Thinkstock

Figure 2 shows a food chain.

Figure 2

Grass → Moose → Wolves

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

Tick **one** box.

- Consumer ☐
- Predator ☐
- Prey ☐
- Producer ☐

(1)

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

Tick **one** box.

- Communities ☐
- Predators ☐
- Prey ☐
- Producers ☐

(1)

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

Figure 3

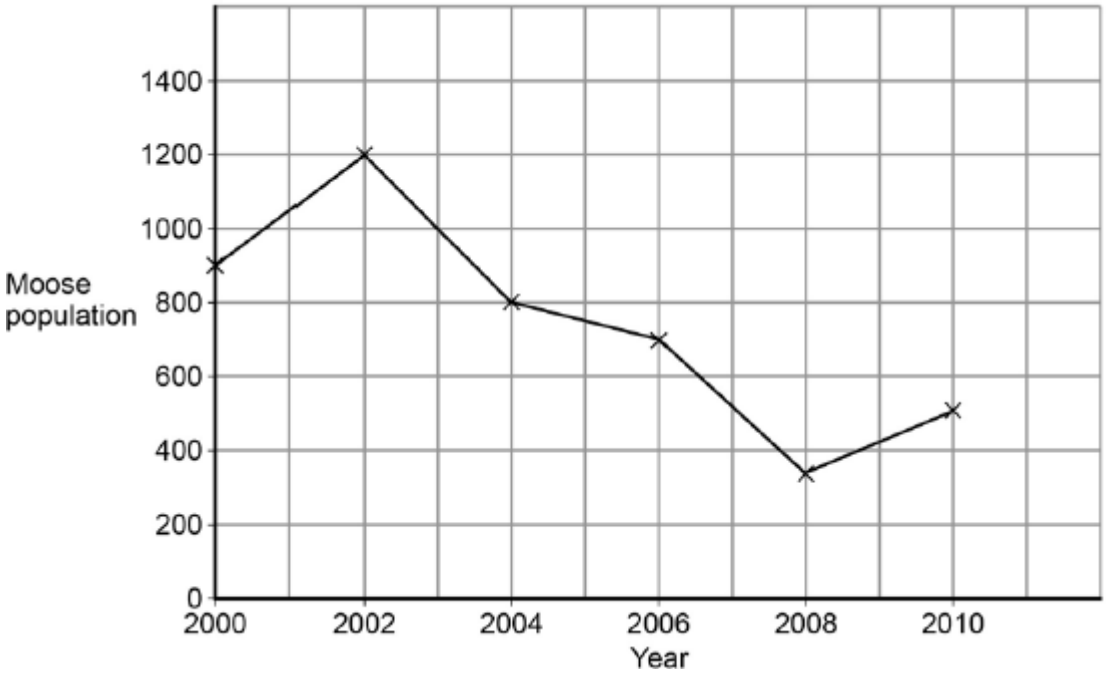
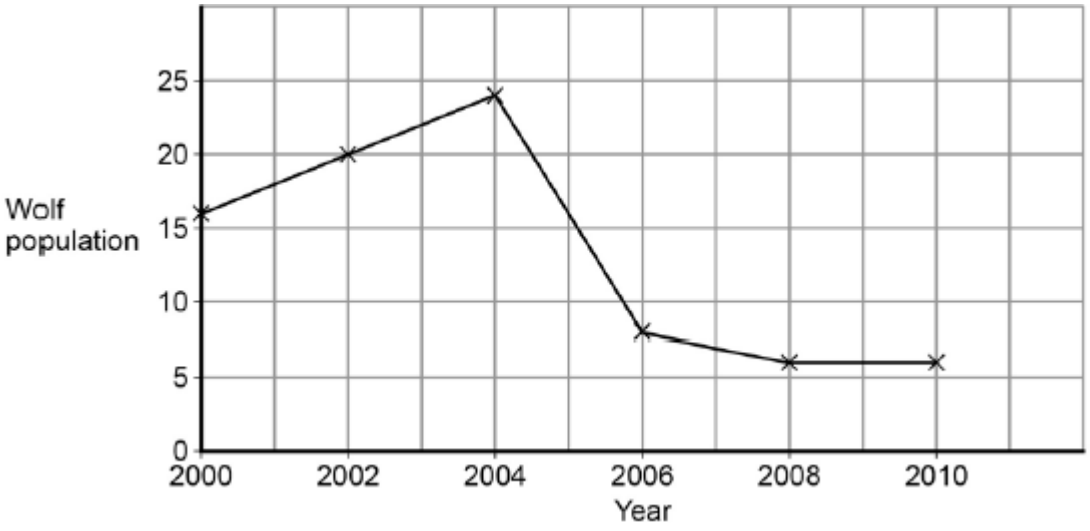


Figure 4



Look at **Figure 3**.

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

What was the size of the moose population in 2002?

_____

(1)

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

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

_____ years

(1)

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

Why does the wolf population increase?

Tick **one** box.

- There is more competition for moose ☐
- There is more food for wolves ☐
- Other animals prey on moose ☐
- There are more predators of wolves ☐

(1)

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

Which of these are **biotic** factors?

Tick **two** boxes.

- Carbon dioxide levels ☐
- Humans hunting ☐
- Light intensity ☐
- Soil type ☐
- Viruses ☐

(2)

(Total 7 marks)

Q31.

The photograph shows an area where a tropical forest is being cleared.

(a) Complete the sentences.

People could use timber from the forest for _____ .

The cleared land can be used for _____ .

Clearing forests increases the concentration of _____ in the atmosphere.

This increase causes global _____ .

(4)

(b) Clearing forests causes some species to become *extinct*.

(i) What is meant by *extinct*?

_____

_____

(1)

(ii) It is important to prevent species from becoming extinct.

Give **one** reason why.

_____

_____

(1)

(Total 6 marks)

Q32.

Animals have adaptations that enable them to survive.

(a) The photograph shows an echidna.

The echidna has pointed spines on its back.

Explain how these spines might help the echidna to survive.

_____

_____

_____

_____

_____

(2)

(b) The photograph shows a caterpillar.

Explain how the caterpillar's appearance might help it to survive.

_____

_____

_____

_____

_____

(2)

(c) Draw a ring around the correct answer to complete each sentence.

(i) Evolution can be explained by a theory called

genetic engineering
mutation
natural selection

.

(1)

(ii) This theory was suggested by a scientist called Charles

Darwin
Lamarck
Semmelweiss

.

(1)

(iii) This scientist said that all living things have evolved from

monkeys
dinosaurs
simple life forms

.

(1)

(d) Many religious people oppose the theory of evolution.

Give **one** reason why.

_____

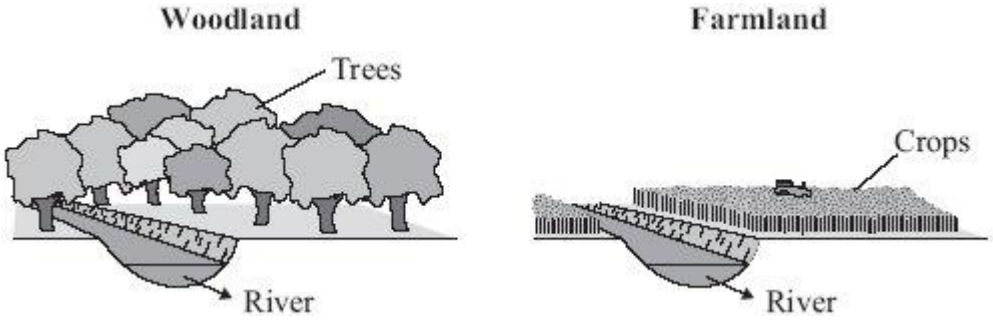
_____

(1)

(Total 8 marks)

Q33.

The drawings show some woodland and some farmland. Both have a river flowing through.



(a) (i) There is a wider variety of wildlife in the woodland than in the farmland.

Give **one** reason why.

_____

_____

(1)

(ii) Farmers remove woodland to provide space for growing crops.

Give **two** other reasons why humans remove woodland.
Do **not** include the uses of wood in your answers.

1. _____

_____

2. _____

_____

(2)

(b) Many farmers spray chemicals on their fields.

Draw a ring around the correct word to complete each sentence.

(i) To make crops grow larger, farmers use

fertilisers
herbicides
pesticides

.

(1)

(ii) To kill insects that feed on the crop, farmers use

fertilisers
herbicides
pesticides

.

(1)

(iii) There is a wider variety of wildlife in the river flowing through the woodland than in the river flowing through the farmland.

Give **one** reason why.

_____

_____

(1)

(c) The population of the UK has increased over the last two hundred years. This increase in population has resulted in damage to the environment.

Apart from farming methods, give **two** ways in which humans damage the environment.

1. _____

_____

2. _____

_____

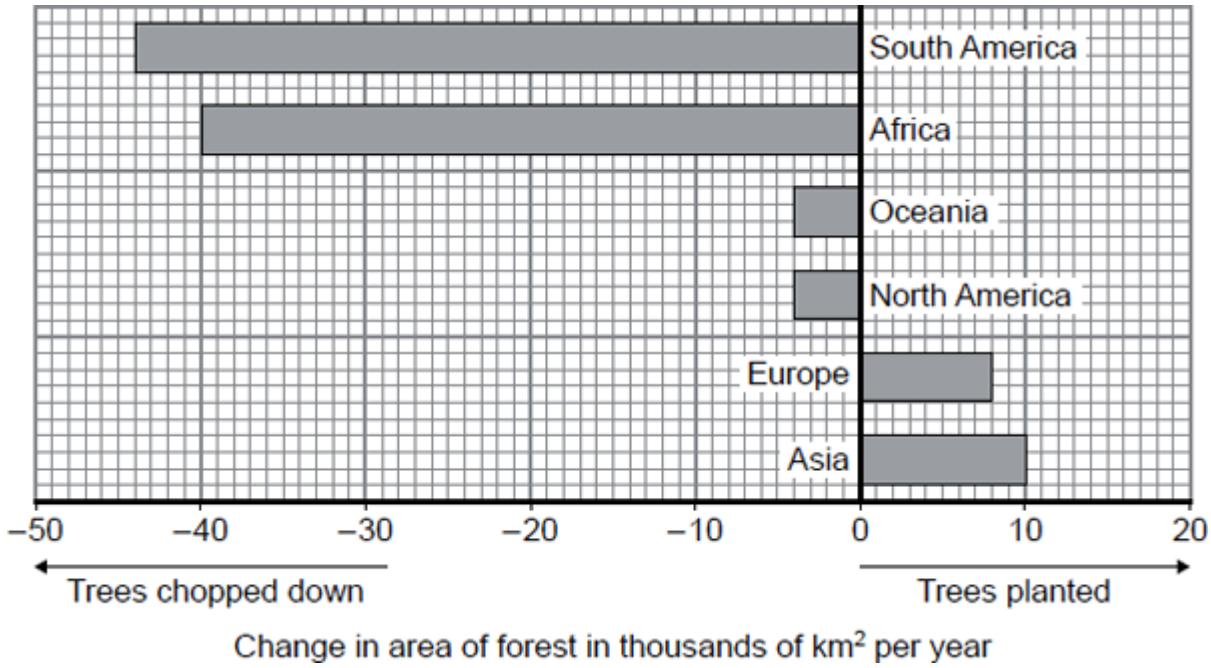
(2)

(Total 8 marks)

Q34.

In many parts of the world, forests are being chopped down (deforestation) so that the land can be used to grow food crops. In other parts, trees are planted to produce new forests.

The graph shows how the area of forest in each of the continents is changing each year.



(a) (i) What area of forest is being lost in Africa each year?

Area = _____ thousand km²

(1)

(ii) Use **Steps 1**, **2** and **3** to calculate the total change to the area of forest each year.

Step 1 Calculate the total area of trees chopped down.

_____

Total area chopped down = _____ thousand km²

Step 2 Calculate the total area of trees planted.

_____

Total area planted = _____ thousand km²

Step 3 Use your answers from **Steps 1** and **2** to calculate the total change in the area of forest.

_____

Total change in area of forest _____ thousand km²

(3)

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

(i) Large scale deforestation reduces the number of species of

plants only.
animals only.
both animals and plants.

(1)

(ii) The remains of the trees are broken down into carbon dioxide by

lichens.
microorganisms.
plants.

(1)

(iii) The gas released into the atmosphere when trees are burned is

carbon dioxide.
methane.
oxygen.

(1)

(Total 7 marks)

Q35.

Soay sheep live wild on an island off the north coast of Scotland. No people live on the island.

By Owen Jones = Jonesor [CC-BY-SA-2.5], via Wikimedia Commons

Over the last 25 years, the average height and mass of the wild Soay sheep have decreased.

The scientists think that climate change might have affected the size of the sheep.

(a) More Soay sheep are now able to survive winter than 25 years ago.

What change in the climate may have helped more Soay sheep to survive winters?

_____

_____

(1)

(b) Complete the sentences.

(i) Soay sheep show variation in size because of differences in their

_____

(1)

(ii) The change in the size of the Soay sheep over 25 years can be explained by Darwin's

theory of _____

(1)

(Total 3 marks)

Q36.

The photograph shows an aardvark.

By Beige Alert [CC BY 2.0], via Flickr

- Aardvarks feed on insects that they dig from the soil.
- Aardvarks hunt for these insects at night.

How does each of these adaptations help the aardvark?

(a) It has powerful claws.

_____

_____

(1)

(b) It has a long, sticky tongue.

_____

_____

(1)

(c) It has very large ears.

_____

_____

(1)

(d) It can cover the end of its nose with flaps of skin.

_____

_____

(1)

(Total 4 marks)

Q37.

The photograph shows a snowy owl.

By Neil McIntosh from Cambridge,United Kingdom
(Snowy Owl uploaded by Magnus Manske)[CC-BY-2.0],
via Wikimedia Commons

- The snowy owl lives in the Arctic.
- It eats small mammals such as mice.

How does each of the following adaptations help the snowy owl to survive?

(a) Its feathers are white.

_____

_____

(1)

(b) It has a thick covering of feathers.

_____

_____

(1)

(c) It makes no sound when it flies.

_____

_____

(1)

(d) It has long, sharp claws.

_____

(1)

(Total 4 marks)

Q38.

Peat can be burnt as a fuel.

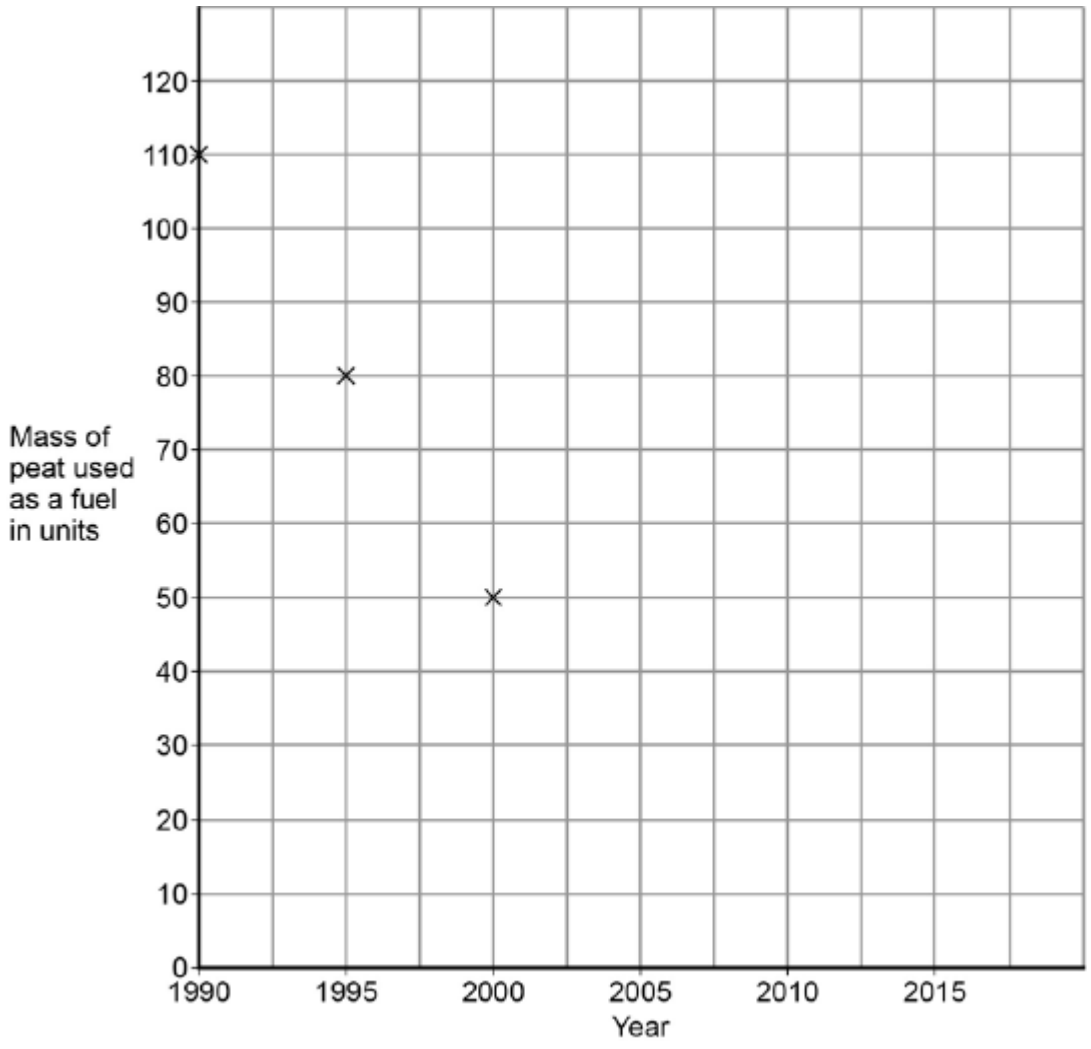
Table 1 shows the amount of peat used as a fuel in the UK over 20 years.

Table 1

Year	Mass of peat used as a fuel in units
1990	110
1995	80
2000	50
2005	20
2010	10

Figure 1 shows some of the information from **Table 1**.

Figure 1



(a) Complete **Figure 1** by plotting the points for 2005 and 2010.

(2)

(b) Predict the amount of peat used as a fuel in the UK in 2015.

Use information from **Figure 1**.

_____

(1)

(c) Plants in the UK are often grown in compost.

Compost usually contains peat.

The coconut fibre shown in **Figure 2** is a waste product of coconut farming.

Coconut fibre can be used to produce peat-free compost.

Figure 2

© afe207/Thinkstock

Table 2 shows features of peat-free compost made using coconut fibre.

Complete **Table 2** to show if each feature is an advantage **or** disadvantage.

Put a tick in each row.

Table 2

Feature compared to peat compost	Advantage	Disadvantage
Coconut fibre is transported longer distances		
Coconut fibre is a waste product		
Coconut fibre traps less air in the soil, so roots absorb fewer mineral ions		

(2)

(Total 5 marks)

Q39.

An animal's feet are adapted to the animal's way of life.

The photographs show the feet of four different animals.

Draw a line from each photograph of feet to the correct adaptation.

Photograph	Adaptation
	Running very fast
	Swimming
	Flying
	Catching and holding prey
	Supporting a very heavy body

(Total 4 marks)

Feet, from top to bottom - By eek the cat [CC BY-ND 2.0], via Flickr. By France64160 (Own work) [GFDL or CC-BY-SA-3.0-2.5-2.0-1.0], via Wikimedia Commons. By IHooq38 [CC BY-ND 2.0], via Flickr. Supplied by iStockphoto/Thinkstock

Q40.

The photographs show some ways in which humans affect the environment.

(a) Coal-burning power stations give off smoke. The smoke contains many different gases.

By Norbert Kaiser (English: own work.) [CC-BY-SA-3.0], via Wikimedia Commons

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

(i) The gas which causes global warming is

carbon dioxide.
oxygen.
sulfur dioxide.

(1)

(ii) The gas which causes acid rain is

methane.
oxygen.
sulfur dioxide.

(1)

(b) The photograph shows a quarry.

By Thomas Bjørkan (Own work) [CC-BY-SA-3.0], via Wikimedia Commons

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

(i) Quarrying

releases methane into the atmosphere.
increases biodiversity.
reduces land available for animals and plants.

(1)

(ii) Quarrying can be reduced by recycling

metals.
paper.
plastic

(1)

(c) The photograph shows a farmer spraying fruit trees.

Photograph supplied by Hemera/Thinkstock

Chemicals in the spray kill insects on the trees.

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

(i) The spray contains

- fertiliser.
- herbicide.
- pesticide.

(1)

(ii) The chemical in the spray might also

- kill other animals.
- kill plants.
- increase biodiversity.

(1)

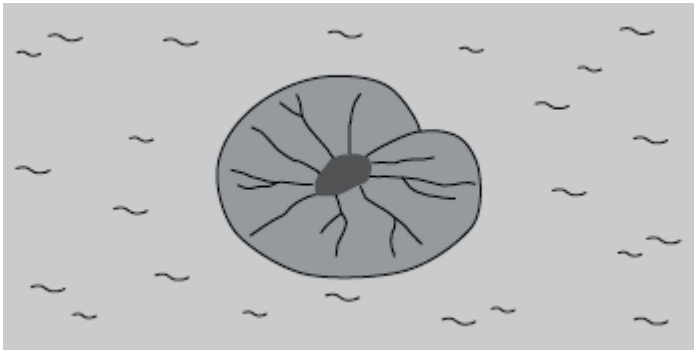
(Total 6 marks)

Q41.

Plants are adapted for survival in many different ways.

Use information from the drawings to answer each question.

(a) This plant lives in ponds. The leaves of the plant float on the surface of the water.



The leaf of this plant is adapted for floating on water.

Suggest how.

_____

_____

(1)

(b) This plant lives in areas where a lot of snow falls.

The triangular shape helps the tree to survive in snowy conditions.

Suggest how.

_____

_____

(1)

(c) This plant has sharp thorns on the stem.

Thorns help this plant survive.

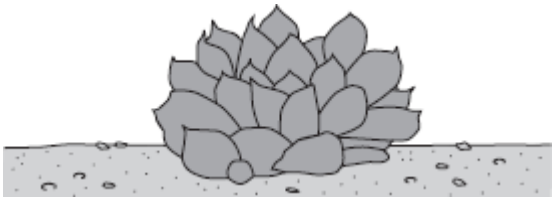
Suggest how.

_____

_____

(1)

(d) This plant lives in very dry areas.



The swollen leaves help this plant to survive in very dry places.

Suggest how.

_____

_____

(1)

(Total 4 marks)

Q42.

The amount of carbon dioxide in the atmosphere is increasing.

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

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

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

Show clearly how you work out your answer.

_____

_____

Answer _____ million tonnes

(2)

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

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

Show clearly how you work out your answer.

_____

_____

Answer _____ million tonnes

(2)

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

Plants use carbon dioxide in the process of

decomposition.

photosynthesis.

respiration.

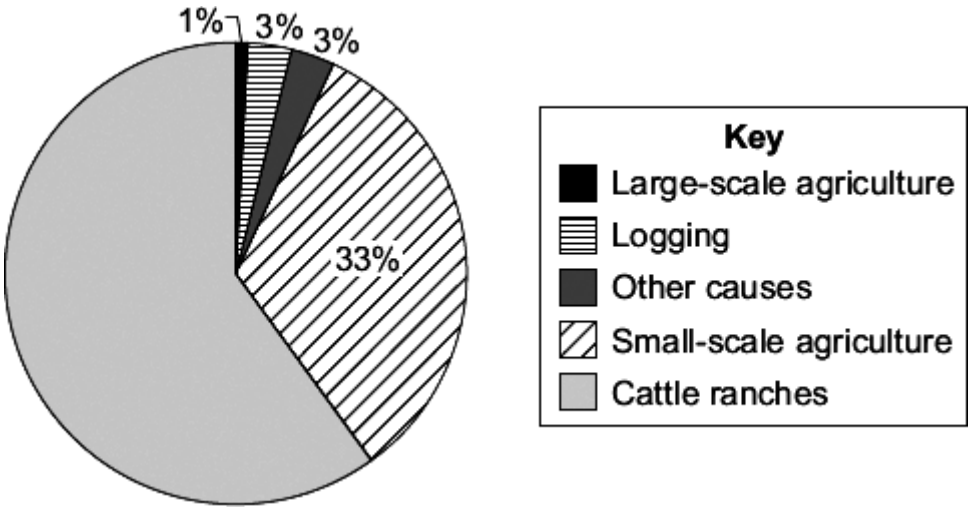
(1)

(Total 5 marks)

Q43.

Large-scale deforestation is taking place in Brazil.

The pie chart shows the causes of deforestation in Brazil.



(a) Calculate the percentage of forest that has been destroyed for cattle ranches.

Show clearly how you work out your answer.

_____

_____

Percentage = _____

(2)

(b) Cattle give off large amounts of methane into the atmosphere.

The methane causes the Earth's temperature to increase.

Give **two** effects of the temperature increase on the environment.

1. _____

_____

2. _____

_____

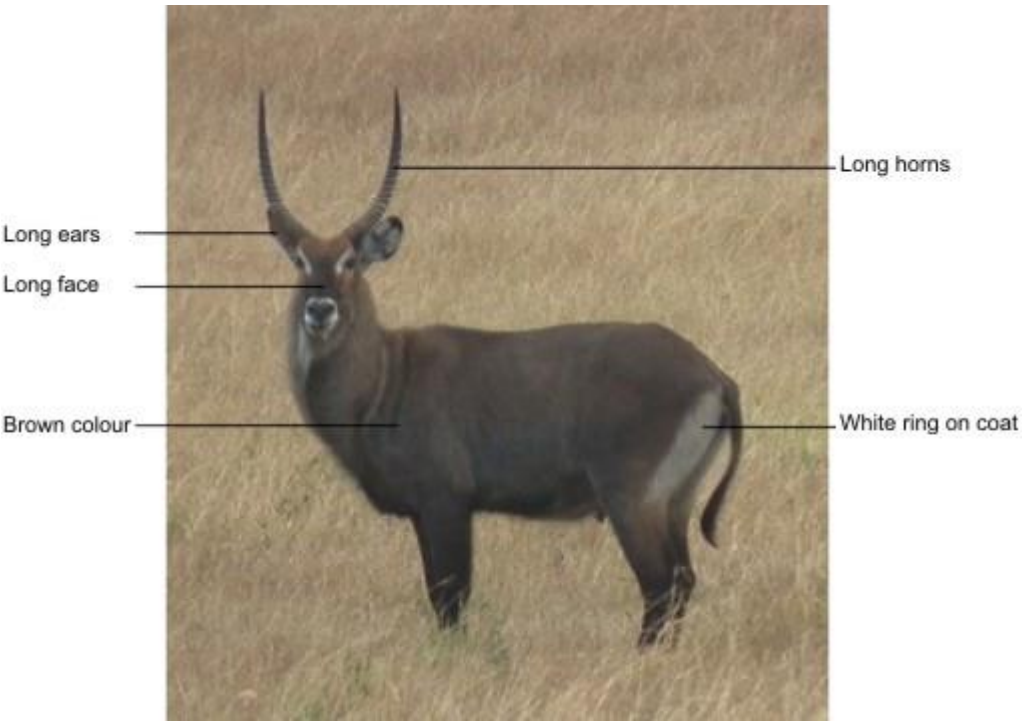
(2)

(Total 4 marks)

Q44.

The photograph shows some features of a waterbuck.

Waterbuck live in areas of tall, brown grass.



By Nevit Dilmen (Own work) [CC-BY-SA-3.0], via Wikimedia Commons

Choose labels from the photograph to answer these questions.
You should choose a label **once** only.

(a) Which feature helps to camouflage the waterbuck in the grass?

_____

(1)

(b) Which feature helps the waterbuck to detect predators?

_____

(1)

(c) Which feature helps the waterbuck to fight predators?

_____

(1)

(d) Which feature helps a baby waterbuck to follow a parent through the long grass?

_____

(1)

(Total 4 marks)

Q45.

Many animals and plants are adapted to stop other organisms eating them.

(a) The photograph shows part of a plant stem.

By Forest & Kim Starr [CC BY 3.0], via Wikimedia Commons

Suggest how this plant is adapted to stop animals eating it.

Adaptation

_____

Describe how the adaptation helps to stop animals eating the plant.

_____

_____

(2)

(b) The photograph shows an insect on a plant twig.

By Fir0002 [CC BY-SA 3.0], via Wikimedia Commons

Suggest how this insect is adapted to stop animals eating it.

Adaptation

_____

Describe how the adaptation helps to stop animals eating the insect.

_____

_____

(2)

(c) The photograph shows some insects.

These insects are bright red.

By Greg Hume (Greg5030) [CC BY 3.0], via Wikimedia Commons

Suggest how these insects are adapted to stop animals eating them.

Adaptation

_____

Describe how the adaptation helps to stop animals eating the insect.

_____

_____

(2)

(Total 6 marks)

Q46.

In a woodland, bluebells grow well every year.

Bluebells growing well in woodland

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

Each year the dead flowers and leaves of the bluebells and leaves from the trees fall onto the ground.
The bluebells do not run out of mineral ions.

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

The words in the box may help you.

roots	**dead leaves**	**mineral ions**
	microorganisms	**decay**

_____

_____

_____

_____

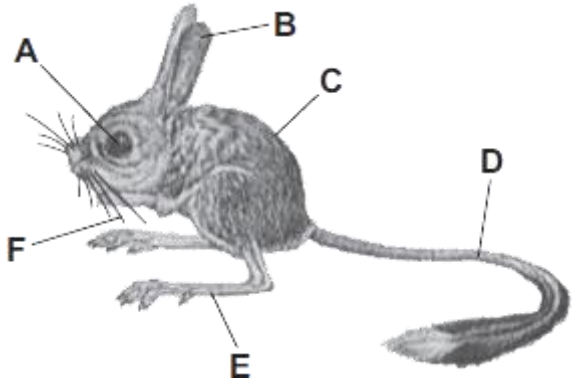
_____

_____

(3)
(Total 3 marks)

Q47.

The drawing shows a jerboa. Jerboas live in sandy deserts.



Jerboas sleep in underground holes during the hot day and come out during the cold night.

The jerboa's main food is small insects which run across the surface of the sand.

For each question write the correct letter in the box.

Which structure, **A**, **B**, **C**, **D**, **E** or **F**:

(a) helps to insulate the jerboa ☐

(1)

(b) helps the jerboa to detect insects on a dark night ☐

(1)

(c) helps the jerboa to hop quickly to catch an insect ☐

(1)

(d) helps the jerboa to keep its balance when hopping ☐

(1)

(e) helps the jerboa to know the width of its underground hole in the dark? ☐

(1)

(Total 5 marks)

Q48.

Scientists have produced many different types of GM (genetically modified) food crops.

(a) Use words from the box to complete the sentence about genetic engineering.

clones	**chromosomes**	**embryos**	**genes**

GM crops are produced by cutting _____ out of the

_____ of one plant and inserting them into the cells of a crop plant.

(2)

(b) Read the information about GM food crops.

- Herbicide-resistant GM crops produce higher yields.
- Scientists are uncertain about how eating GM food affects our health.
- Insect-resistant GM crops reduce the total use of pesticides.
- GM crops might breed naturally with wild plants.
- Seeds for a GM crop can only be bought from one manufacturer.
- The numbers of bees will fall in areas where GM crops are grown.

Use this information to answer these questions.

(i) Give **two** reasons why some farmers are in favour of growing GM crops.

1. _____

_____

2. _____

_____

(2)

(ii) Give **two** reasons why many people are against the growing of GM crops.

1. _____

_____

2. _____

_____

(2)

(Total 6 marks)

Q49.

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

(a) The students decided to use quadrats.

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

_____

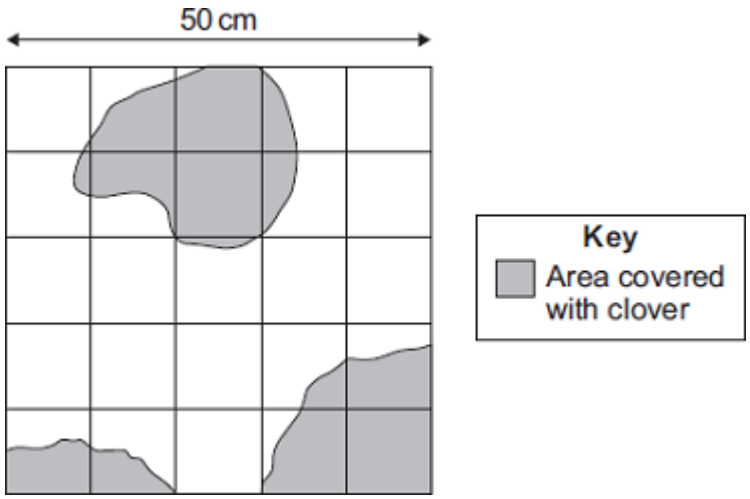
_____

_____

_____

(2)

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



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

_____

_____

Number of squares = _____

(1)

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

_____

_____

_____

(1)

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

_____

_____

_____

Answer = _____ %

(2)

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

_____

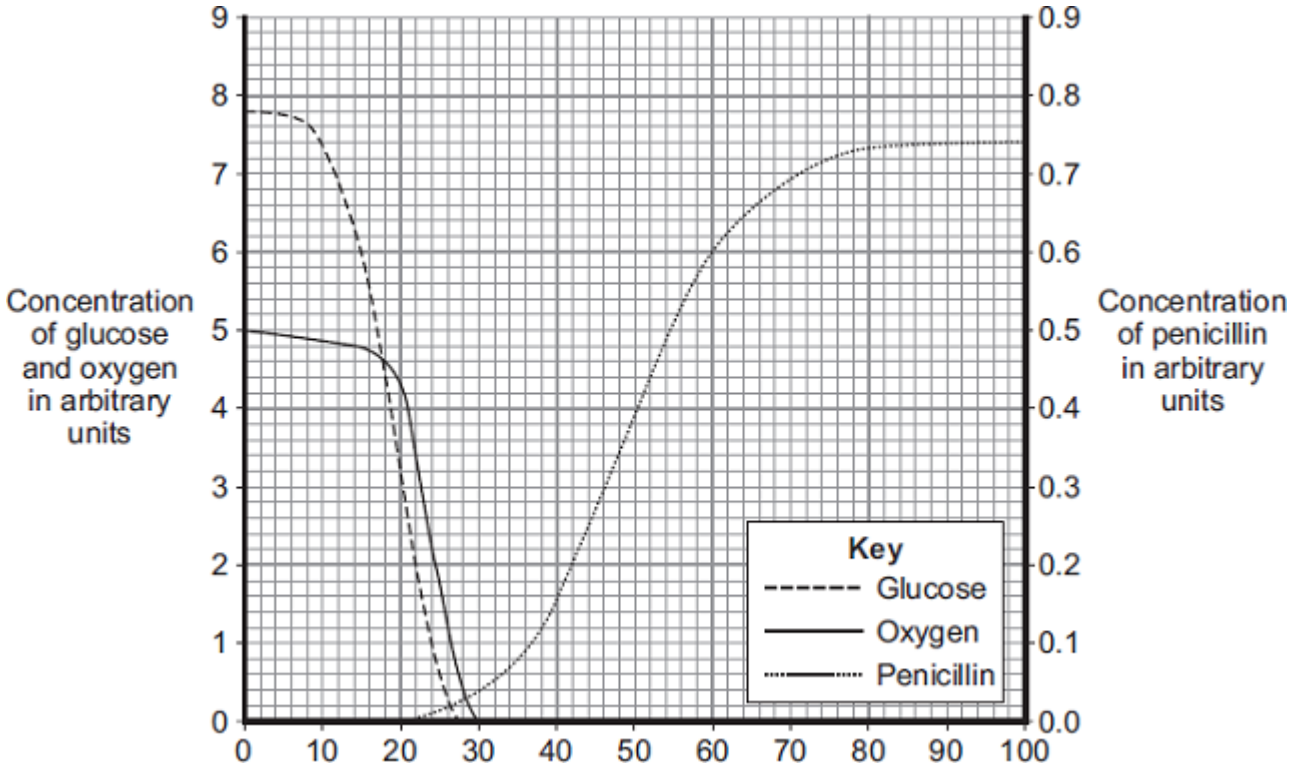
(1)

(Total 7 marks)

Q50.

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

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



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

Draw a ring around **one** answer.

0 – 20 hours **40 – 60 hours** **80 – 100 hours**

(1)

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

_____

_____

_____

_____

(2)

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

Tick (✓) **two** boxes.

The oxygen concentration changes after the glucose concentration. ☐

The oxygen concentration changes before the glucose concentration. ☐

The oxygen concentration changes less than the glucose concentration. ☐

The oxygen concentration changes more than the glucose concentration. ☐

(2)

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

Draw a ring around **one** answer.

distillation **filtration** **respiration**

(1)

(Total 6 marks)

Q51.

Many organisms are adapted to avoid being eaten.

(a) The photograph shows a gecko on a leafy branch.

The gecko is adapted to avoid being eaten by predators.

Explain how.

_____

_____

_____

_____

(2)

(b) Ants can give a painful bite.

The photograph shows a type of ant living on acacia trees.

Acacia trees have thorns on their branches.

Branch of acacia tree.

By Ryan Somma, cropped by Fama Clamosa,
20 January 2010 (UTC) [CC-BY-SA-2.0], via Wikimedia Commons

(i) Predators are less likely to eat ants living on acacia trees than ants living on the ground.

Suggest why.

_____

_____

(1)

(ii) Giraffes eat the leaves of acacia trees.

Giraffes do **not** eat the leaves of acacia trees that have ants living on them.

Suggest why.

_____

_____

(1)

(c) The photographs show a wasp and a hoverfly.

The wasp and the hoverfly both have black and yellow stripes.

Wasp **Hoverfly**

© Alexandr Pakhnyushchyy/iStock

© Richard Majlinder/iStock

Wasps have stings, but hoverflies do **not**.

The stripes on the hoverfly help the hoverfly to avoid being eaten by predators.

Explain why.

_____

_____

_____

_____

(2)

(Total 6 marks)

Q52.

Animals and plants are adapted in different ways in order to survive.

(a) Plants may have to compete with other plants.

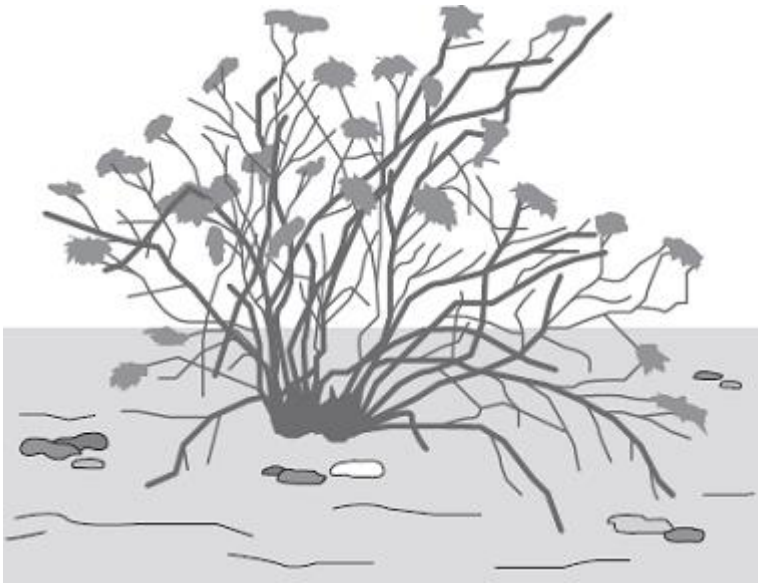
(i) Name **two** things for which plants compete.

1. _____

2. _____

(2)

(ii) The drawing shows a creosote bush.



This bush lives in a desert.

The creosote bush produces a poison that kills the roots of other plants.

How does this poison help the creosote bush to survive in the desert?

_____

_____

(1)

(b) The photograph shows an insect called a katydid.

By Ltshears (Own work) [Public domain], via Wikimedia Commons

The katydid is preyed on by birds.

How does the appearance of the katydid help it to survive?

_____

_____

_____

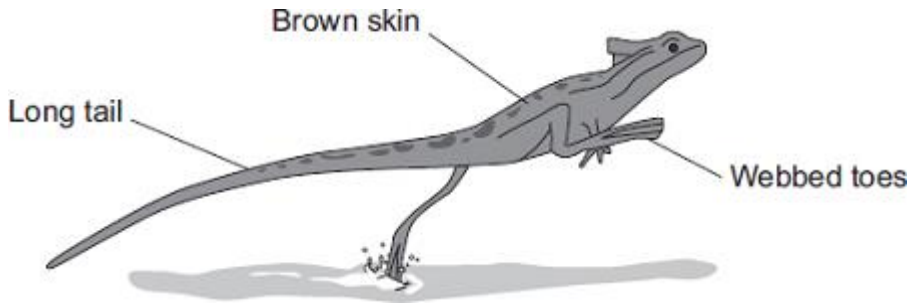
_____

(1)

(Total 4 marks)

Q53.

The picture shows a basilisk lizard. Some of the adaptations of the lizard are labelled.



Basilisk lizards are often found resting on branches of trees that grow next to water.
Basilisk lizards can run across the surface of the water.

(a) Draw **one** line from each adaptation of the lizard to the advantage of the adaptation.

Adaptation	**Advantage**
	For camouflage on branches of trees
Toes on the back feet are webbed	
	Helps the lizard to balance when running
Long tail	
	Warning colours to deter predators
Brown skin	
	Increases surface area in contact with the water

(3)

(b) Suggest **one** advantage to the basilisk lizard of being able to run across the surface of the water.

_____

_____

(1)

(c) Animals, such as lizards, compete with each other.

Give **two** factors that animals compete for.

Tick (✓) **two** boxes.

Oxygen	☐
Food	☐
Territory	☐
Light	☐

(2)

(Total 6 marks)

Q54.

Some students wanted to find the number of thistle plants growing on a lawn.
The students placed 10 quadrats at different positions on the lawn.
Each quadrat measured 1 metre × 1 metre.
The students counted the number of thistle plants in each quadrat.

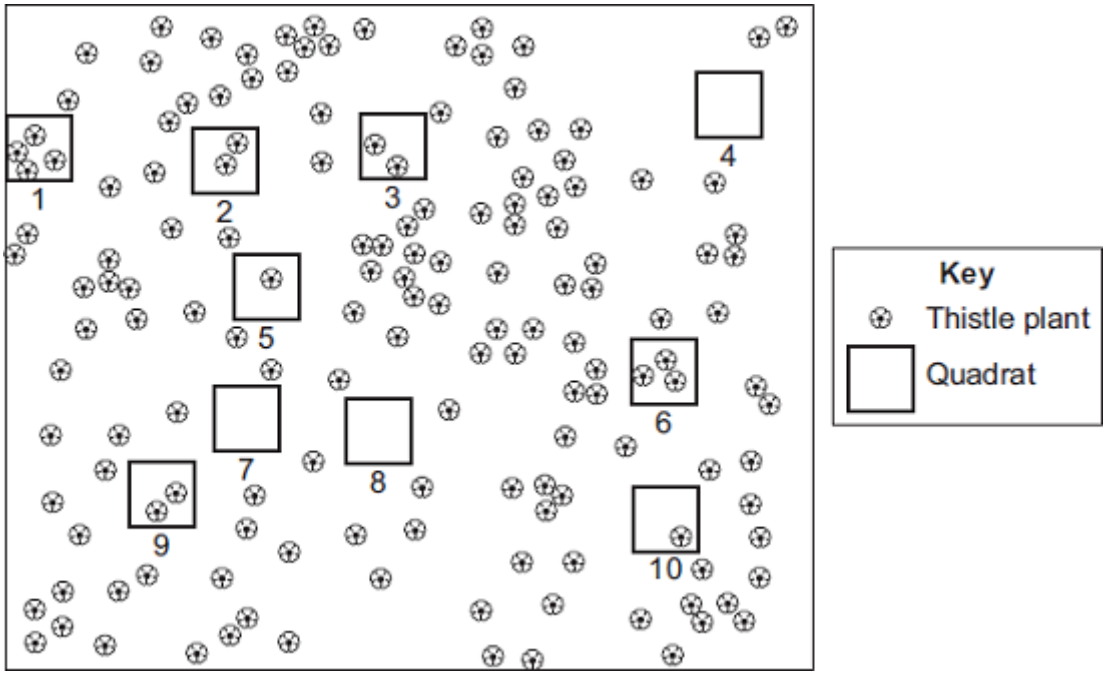
(a) Which method should the students use to decide where to place the 10 quadrats?

Tick (✓) **one** box.

Place the quadrats as evenly as possible around the lawn.	☐
Place 5 quadrats in areas with many thistle plants and 5 quadrats in areas with only a few thistle plants.	☐
Place all the quadrats randomly on the lawn.	☐

(1)

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



(i) Complete the table to show:

- how many thistle plants the students found in each of the first four quadrats
- the total number of thistle plants found in all 10 quadrats.

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

(2)

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

_____

Mean = _____

(1)

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

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

_____

_____

Estimated number of thistle plants = _____

(2)

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

_____

_____

(1)

(Total 7 marks)

Q55.

Global warming may reduce biodiversity in some areas.

(a) What is biodiversity?

Tick **one** box.

The different habitats in an ecosystem	☐
The interaction of living and non-living factors in a habitat	☐
The interdependence of organisms on Earth	☐
The total number of organisms in an ecosystem	☐
The variety of different species on Earth	☐

(1)

(b) What gases cause global warming?

Tick **two** boxes.

Carbon dioxide	☐
Methane	☐

Nitrogen ☐

Oxygen ☐

Water vapour ☐

(2)

(c) Give **two** effects of global warming that could reduce biodiversity in an area.

1. _____

_____

2. _____

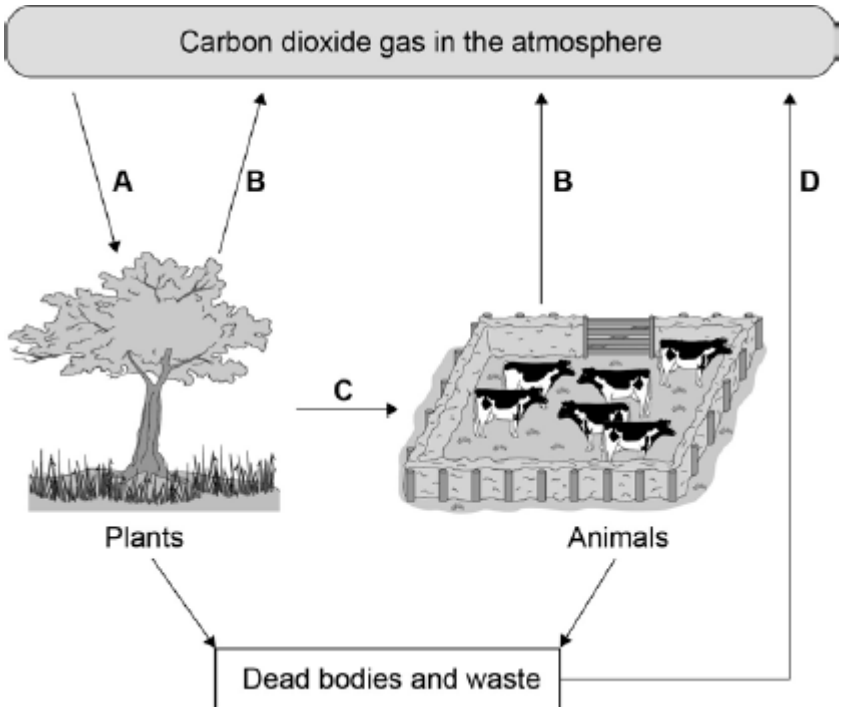
_____

(2)

(Total 5 marks)

Q56.

The figure below shows the carbon cycle.



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

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

What is process **A**?

Tick **one** box.

Evaporation ☐

Fossilisation ☐

Photosynthesis ☐

Respiration ☐

(1)

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

What is process **B**?

Tick **one** box.

Burning ☐

Feeding ☐

Photosynthesis ☐

Respiration ☐

(1)

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

Tick **one** box.

A ☐

B ☐

C ☐

D ☐

(1)

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

_____

_____

(1)

(e) Greenhouse gases cause global warming.

Carbon dioxide is a greenhouse gas.

Name **two** other greenhouse gases.

1. _____

2. _____

(2)

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

The process of decay returns carbon dioxide to the atmosphere.

What type of organism causes decay?

_____

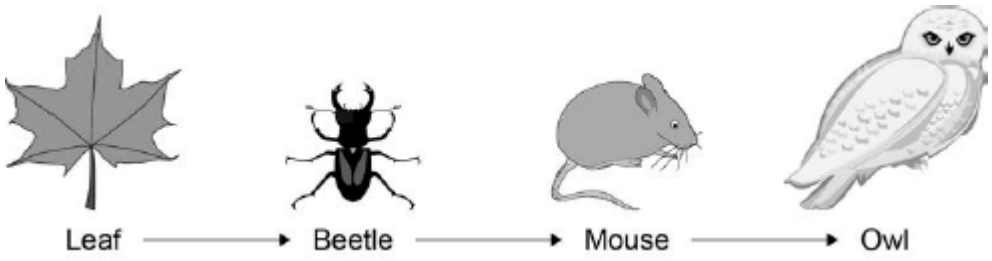
(1)

(Total 7 marks)

Q57.

Feeding relationships can be shown using food chains.

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



(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 ☐
- Light intensity ☐
- New diseases ☐
- New predators ☐
- Wind direction ☐

(2)

(Total 5 marks)

Q58.

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

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

Figure 1

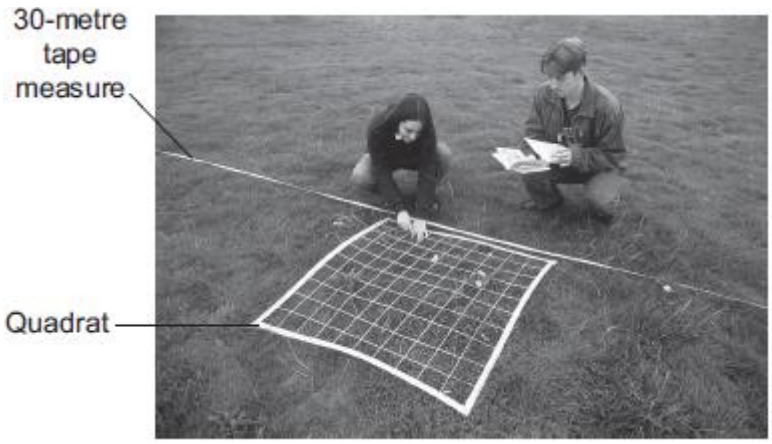
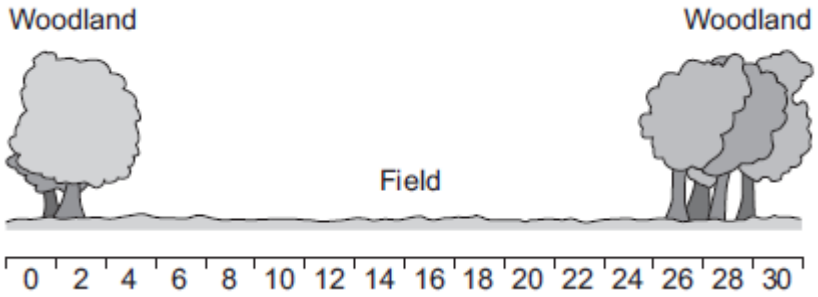


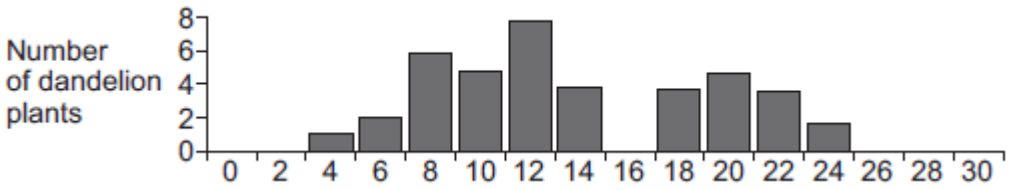
Figure 2 shows a section across the area studied and **Figure 3** shows a bar chart of the students' results.

Figure 2



Distance in m

Figure 3



Distance in m

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

Use information from **Figure 1**.

(3)

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

_____

_____

(1)

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

_____

_____

(1)

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

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

_____

_____

_____

_____

(2)

(Total 7 marks)

Q59.

(a) Which term describes organisms that can tolerate very hot or very cold places?

Draw a ring around the correct answer.

an environmental species	**an extremophile species**	**an indicator species**

(1)

(b) **Figure 1** shows photographs of an Adelie penguin and a chinstrap penguin. Adelie penguins and chinstrap penguins live in the Antarctic at temperatures below 0 °C.

Figure 1

Adelie penguin

© pilipenkoD/iStock/Thinkstock

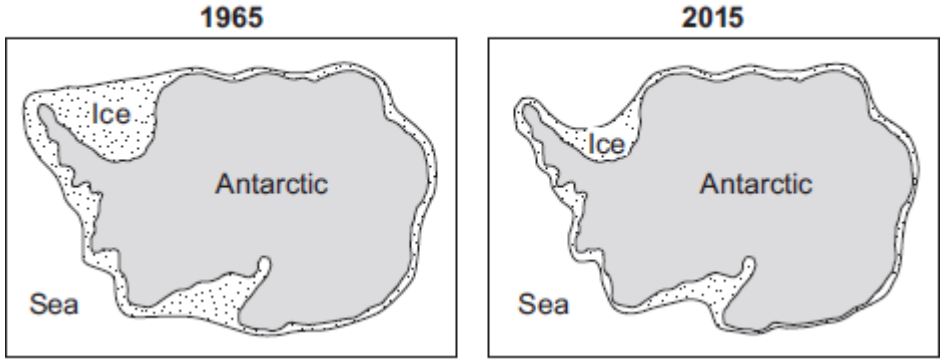
Chinstrap penguin

© Jenny Grayson/iStock/Thinkstock

Adelie penguins spend most of their time on the ice around the Antarctic.
Chinstrap penguins live mainly in the sea around the ice.
Since 1965 the number of Adelie penguins has **decreased** by 6 million.

Figure 2 shows changes to the ice around the Antarctic over the past 50 years.

Figure 2



(i) Use information from **Figure 2** to explain why the number of Adelie penguins has decreased since 1965.

_____

_____

_____

_____

_____

_____

(2)

(ii) Suggest what has happened to the number of chinstrap penguins since 1965.

Draw a ring around your answer. **increase / decrease**

Give a reason for your answer.

_____

_____

(1)

(c) The number of penguins can be used to monitor changes in temperature of the environment.

Temperature readings could also be taken using a thermometer.

What is the advantage of using penguins, instead of a thermometer, to monitor changes in temperature of the environment?

Tick (✓) **one** box.

Living organisms show long-term changes. ☐

Thermometers cannot measure temperatures below 0 °C. ☐

Thermometers do not give accurate readings. ☐

(1)

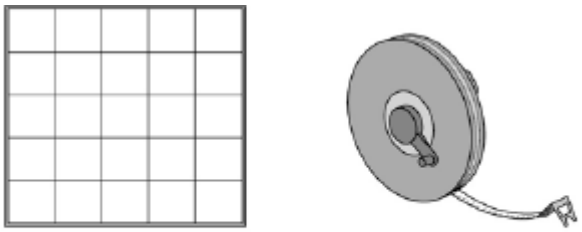
(Total 5 marks)

Q60.

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

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

Figure 1



This is the method used.

1. Place the quadrat in an area where there are lots of ribwort plants in the field.
2. Count the number of ribwort plants inside a quadrat.
3. Repeat steps 1 and 2 four more times.

(a) How could the student improve his method so that he can collect valid results?

Tick **two** boxes.

- Count the leaves of each ribwort plant ☐
- Place more quadrats in the field ☐
- Place the quadrats randomly ☐
- Use a smaller quadrat ☐
- Weigh the ribwort plants ☐

(2)

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

The area of the field was 8250 m^2.

Calculate the total number of ribwort plants in the field.

_____

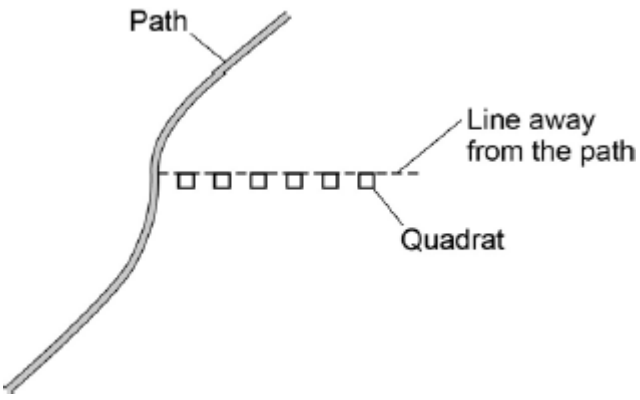
Total number of ribwort plants = _____

(1)

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

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

Figure 2



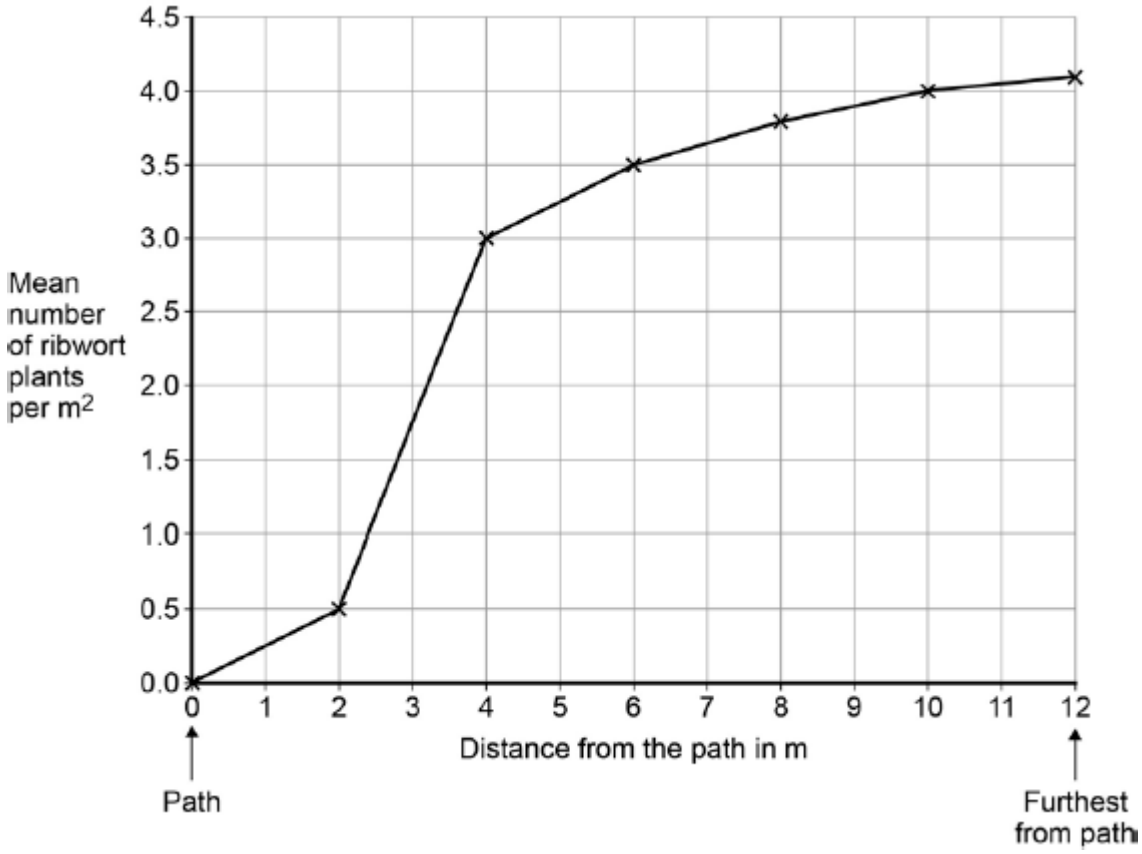
What is the name given to the line in **Figure 2**?

_____

(1)

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

Figure 3



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

_____

_____

_____

_____

(2)

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

Tick **one** box.

There is less light near the path ☐

The ribwort plants get walked on ☐

There are more nutrients in the soil near the path ☐

There are fewer animals near the path ☐

(1)

(Total 7 marks)

Mark schemes

Q1.

(1) A
(2) C
(3) B
(4) D

for 1 mark each

[4]

Q2.

(a) two thirds/66%

for 1 mark

1

(b) 2 of:
by sewage
by chemicals fertilizers

any 2 for 1 mark each

2

[3]

Q3.

(a) any **three** from:

space

accept land, room

water

accept rain

nutrients

accept fertilisers, nitrates, minerals
*do **not** accept food*
*do **not** accept just sun*

light

carbon dioxide

3

(b) herbicides

1

[4]

Q4.

(a) 1960 **or** 1961

1

(b) birth rate

accept reproductive rate

1

(c) (i) 1963

1

(ii) Fin go down
Sei go up

both are required for the mark to be given

1

(d) any **one** from

there are fewer Fin whales so Sei whales start being caught more

Sei whales are breeding more

accept population goes up

there are more Sei whales because there are fewer Fin whales to eat their food to compensate for lower catches of other whales

accept argument based on predation

1

[5]

Q5.

(a) predator
prey

no alternatives
for 1 mark each

2

(b) *idea that*
(wasps) increase OR decrease

gains 1 mark

but
(wasps) increase then decrease/peaks at

gains 2 marks
answers must match

idea of change in food supply/whiteflies
more food/whiteflies OR less food/ whiteflies

gains 1 mark

but
more food/whiteflies then less food/whiteflies

gains 2 marks

or
wasps follow trend in whiteflies

for 2 marks

or
linked to increase/decrease other environmental effects
e.g. more/less food for wasps, use of insecticide
e.g. temperature change, other predator
If increase/decrease not given then second part (reason) gains no marks

for 1 mark each

4

(c) *idea that*
wasps die out/die off/fly away/migrate/leave greenhouse but NOT 'die' alone
for 1 mark

1

[7]

Q6.

(a) B plants are:
taller
smaller/thinner leaves
thinner stem or vice versa in referring to A plants
any two for 1mark each

2

(b) water/rain/moisture
nutrients/any specific mineral (N/P/K)
each for 1 mark

2

[4]

Q7.

(a) (i) predator (allow carnivore)

(ii) prey
each for 1 mark

2

(b) fewer ladybirds; because less food/ladybirds starve
or
no change; because alternative food supply
each for 1 mark

2

(c) any two suitable environmental effects e.g.
food;
diseases;
other predators;
space;
insecticides
any two for 1 mark each

2

[6]

Q8.

(a) trees in wood (allow converse)
taller
fewer leaves
thinner trunks
fewer branches
branches/leaves at top only
any 2 for 1 mark each

2

(b) light
water
space
nutrients
(*allow up to 2 named substances e.g. CO_2/O_2/NO_3)*
any 3 for 1 mark each

3

[5]

Q9.

(a) carbon dioxide

1

methane

1

greenhouse effect

1

(b) coal / oil / gas / peat / petrol / paraffin

1

[4]

Q10.

(a) any **one** from

big, flat feet

long eyelashes

long hair around openings to its ears

1

(b) (the came) does not need insulation
accept can keep warm without the fat

1

(c) any two from:

- (the camel) can drink large amounts of water in one go
- loses little water by urine and/or sweating
- (the camel) can use fat from its hump to produce water
any order for the reasons

2

[4]

Q11.

(a) any **three** from
different factors are required for each mark

hares breeding

(amount) of food **or** plants available

eaten by lynx **or** predators **or** reference to size of lynx / predator population

hares dying **or** reference to being killed by humans

disease (spreads through the population)

(competition) for space **or** (lack of) space)

*alternative to either of these points but not both change in environment **or** habitat*

temperature **or** weather **or** climate

3

(b) any **two** from

more food **or** hares for lynx encourages more breeding (in lynx)

accept less food, less breeding

more food **or** hares allows greater survival rate of cubs **or** adult lynx

accept less food, less survival

idea of time lag for breeding **or** time lag for dying

2

[5]

Q12.

(a) (long) roots

1

(b) prevents water from evaporating

accept to reduce/stop water loss

1

[2]

Q13.

any **three** from

building

accept building of houses, roads, power stations

quarrying

farming

'dumping' waste

[3]

Q14.

camouflage (when hunting)

*accept the idea that the white coat prevents the prey **or** predator 'seeing' the Arctic fox*

1

insulation (from cold)

*accept an idea that the thick coat retains body heat **or** traps air **or** that air in the fur is a poor conductor **or** keeps it warm*

NEUTRAL RESPONSES –
protection, waterproof

1

[2]

Q15.

(a) **Quality of Written Communication**
The answer to this question requires ideas in good English, in a sensible order with correct use of scientific terms. Quality of written communication should be considered in crediting points in the mark scheme.

max 2 if ideas not well expressed

in summer more greenfly

accept increase in population

1

in winter less greenfly

accept decrease in population

1

over the three years greenfly numbers decrease

*accept fall **or** drop for decrease*

1

(b) any **one** from

(number of) greenfly

severe **or** cold winters
toxic chemicals
destruction of habitats
disease
predators
weather
temperature

do not accept food

1

[4]

Q16.

(a) sulphur dioxide
sewage
pesticides

for 1 mark each

3

(b) *idea of* reduced numbers / loss of habitat (home) / killed or damaged by pollution

for 1 mark

1

[4]

Q17.

(a) habitats destroyed

*accept idea that the places to live **or***
*food **or** minerals are reduced **or** less shelter*

1

(b) any **two** from

fertilisers / named fertilisers
accept sewage / lime

pesticides

herbicides

2

[3]

Q18.

(a) long hind legs / muscular hind legs / bent hind legs
accept powerful hind legs
accept back legs act as spring

1

(b) colour / markings warns predators not to eat it
allow animals learn not to eat them
ignore camouflage

1

[2]

Q19.

(a) (i) any **two** from:
list principle

- light
  ignore oxygen / food / sun
- water
- space
- nutrients / ions / minerals / named
- carbon dioxide / CO_2

2

(ii) less competition for water
ignore space / light / food

or

more water / nutrients / minerals available

1

(b) camouflage / same shape as leaf / looks like a leaf
allow 'blends in'
ignore colour

1

[4]

Q20.

(a) (i) traps air

note 'keeps warm' is stem

1

(increases) insulation effect **or** retains body heat or prevents heat loss

accept air is a poor (thermal) conductor

*do **not** credit acts as a barrier unless qualified by a prevention of heat loss*

1

(ii) **increases** insulation

*do **not** accept keep warm*

1

retains body heat or prevents heat loss

accept:
*stored fat can be broken down **or** respired **or** burned (1 mark)*
credit 'used for energy'

to release (thermal) energy (1 mark)
*do **not** credit create energy*

1

(iii) less **or** smaller surface area (per unit mass or volume)

*accept uses more glucose **or** respires more*

*do **not** credit small surface area*

1

and

less heat loss (for its mass) or explanation of this idea

generates more heat

1

(b) (coloured) to match or blend in with environment

*accept this idea in candidate's own words e.g disguised **or** specific example*

1

any **one** from:
prevents predation
aids hunting

accept this idea in own words

1

(c)

*note: marks are awarded for an indication of enhanced qualities **or** adaptations of xerophytes*

*do **not** credit an unqualified **effect***
*e.g. small surface area **or** they can store water **or** spikes **or** prickly leaves related to protection*

any **two** from:

widespread roots
long roots
spiky leaves or needles
hidden **or** sunken stomata
fleshy leaves **or** stems **or** roots for water storage
leaves arranged to **funnel** dew to roots
hairy **or** rolled leaves
light colour

*accept no **or** fewer stomata*

accept no leaves

accept crassulacean acid metabolism
*accept ephemeral (flowering **or** leaf loss **or** production)*

accept reverse diurnal pattern of stomatal opening (stomata open at night)

2

[10]

Q21.

e.g.
waste gases/air pollution harms living organisms
dumped waste can make land unfit to live on/
drainage pollutes water/harms organisms

for 1 mark each

(if no marks can allow – pollution harms organisms = 1)

[2]

Q22.

(a) (i) building
or
wood/timber/furniture
or
paper
or
packaging
or
fuel/burning

*do **not** accept 'logs' by itself*

1

(ii) farming/agriculture
or
building
or
roads

1

(iii) increased CO_2

1

(b) (i) trees photosynthesise/less photosynthesis takes place (and)

accept burning trees (1)

1

trees/photosynthesis uses carbon dioxide

releases CO2 (1)

1

lets in heat/energy

*do **not** accept sunshine*

1

prevents it escaping (from the atmosphere)
or
being reflected/retransmitted into space

1

(ii) global warming

accept increased 'el nino'

or
a named effect of global warming such as polar ice cap melt, climatic change, increased temperature/sea level rising

accept warmer weather

1

[8]

Q23.

(a) any **two** from:

- streamlined / shape reduces friction / long and thin / smooth surface OWTTE
- fins / flippers / tail / paddle

  *do **not** accept 'arms' or 'legs'*
- structures that push against water

2

(b) (i) any **two** from:

fossil has hind limb / legs / feet

it = minke

accept any valid comparison

fossil has more ribs / bones

fossil has teeth

fossil has curved spine

2

(ii) billion

1

give evidence for

1

[6]

Q24.

(a) **X** (no mark)

X is more visible **or Y** is more camouflaged

1

(b) (i) so camouflage not changed **or** so not easier to see

1

(ii) 25

1

7

1

(iii) any **one** from:

- eaten (by birds) / died
- mixed in with large number of unmarked moths
- moved away

1

(c) (i) DNA

1

(ii) the gene / allele for being dark / dominant

1

[7]

Q25.

(a) (i) carbon dioxide

accept other positive indications

1

(ii) methane

1

accept other positive indications

(b) increase

accept other positive indications

1

(c) any **three** from:

building

accept houses / airports / roads / factories

farming / removing hedgerows / fire

*do **not** accept pesticides, fertilisers etc*

quarrying / mining

industry

accept release of toxic chemicals / named eg
*accept acid rain / global warming only if linked to production by human activity do **not** accept just 'pollution'*

drainage of marshland

dam construction / flooding land

dumping waste

*do **not** accept fly tipping, litter*

3

[6]

Q26.

(a) (i) increases

1

(ii) decreases

1

(b) any **two** from:

- competition for water
- competition for ions / minerals / salts / nutrients

  accept correct named example
  *do **not** accept food*
  *do **not** accept <u>all</u>*

- competition for light

2

(c) kills / harms other / named organisms

1

[5]

Q27.

The answer to this question requires good English in a sensible order with correct use of scientific terms. Quality of written communication should be considered in crediting points in the mark scheme.

*maximum of **4** marks if ideas not well expressed*

Polar bear has

white fur - camouflage **or** not seen by prey

accept converse points re sun bear

1

thick(er) fur - insulation **or** keeps heat in

<u>number must be comparative</u>
numbers given must be explained
*do **not** accept keeps warm / keeps out the cold*

1

thicker fat - insulation **or** keeps heat in

1

energy reserve **or** can release heat

1

lower S.A - slower / less heat loss
(re body size)

1

[5]

Q28.

(a) points plotted accurately

$+\frac{1}{2}$ *square*

deduct 1 mark per error
ignore the line

2

(b) 30 **or** correct from candidate's graph

accept 30 000 lynx
*do **not** accept 30 000*

1

(c) (i) fall

mark (i) and (ii) separately

1

(ii) fewer hares **or** lack of food

*do **not** accept <u>no</u> hares or food*

1

(d) kills / preys / preys on / hunts / catches
<u>and</u> eats / for food (other) animals

*must have the eat **and** kill for the point*

1

[6]

Q29.

(a) (i) conserves water owtte

1

(ii) prevents overheating / keeps cool

allow cooler at night
allow safety from predators

1

(iii) increases heat loss / cooling

allow prevents sinking into sand

1

(b) animal could overheat owtte

1

[4]

Q30.

(a) producer

1

(b) predators

1

(c) 1200

1

(d) 2 (years)

1

(e) there is more food for wolves

1

(f) humans hunting

1

viruses

1

[7]

Q31.

(a) fuel / houses / paper

allow any object made from wood

1

farming / agriculture / replanting

allow roads / homes / factories

1

carbon dioxide / greenhouse gas / pollution **or** relative named pollutant

1

warming / temperature increase

1

(b) (i) none of species left / died out

1

(ii) may have products useful to humans / examples

*allow preserve for future generations **or** 'still there to look at'*

*allow affect food chains / cycles **or** extinction of other species*

allow non human reasons eg loss of habitat

ignore environmental effects

1

[6]

Q32.

(a) protection / defence

*ignore insulation **or** rolls into a ball*

ignore camouflage

1

from predators / from being attacked / from being eaten

1

(b) looks like snake / looks scary

1

deters predators **or** has large eyes to spot predator **or** camouflage **or** warning colouration from predator or prey

*allow **two** separate adaptations for **2** marks*

1

(c) (i) natural selection

1

(ii) Darwin

1

(iii) simple life forms

1

(d) believe that God created all organisms **or** humans there from the beginning

1

[8]

Q33.

(a) (i) (more) habitats / (greater) variety of habitats / range of food

*allow (more) places / trees for homes **or** different places to live*

allow no pesticides /herbicides / chemicals sprayed

allow more food

allow safer / can hide

allow effects of machinery

1

(ii) any **two** from:

- building /houses / factories / etc
  ignore timber / uses of wood
- roads
- quarrying
- waste dumps / landfill
- grazing

2

(b) (i) fertilisers

1

(ii) pesticides

1

(iii) pesticide / herbicide / chemicals / sprays

allow river (through farmland) polluted
allow correct effect of fertilisers on river organisms

1

(c) any **two** from

- pollution / named pollutant / combustion / cars
- dumping waste / litter
  allow 'not recycling'
- raw materials used up **or** reference to quarries / mines
- chopping down trees

- building / houses / etc
- global warming

2

[8]

Q34.

(a) (i) 40

accept -40 or +40

1

(ii) **Step 1** 92

1

Step 2 18

1

Step 3 74

*correct subtraction of answer in **step 2** from answer in **step 1** gains **1** mark*

*correct answer 74 with no working gains **3** marks*

ignore sign

1

(b) (i) both animals and plants

1

(ii) microorganisms

1

(iii) carbon dioxide

1

[7]

Q35.

(a) warmer / dryer

allow greenhouse effect / global warming

ignore wind

1

(b) (i) genes / alleles / chromosomes / DNA / genetic material / genetics

allow inheritance

allow nutrition / food / metabolism / growth <u>rate</u>

ignore environment

1

(ii) natural selection / evolution

allow survival of the fittest

1

[3]

Q36.

(a) digging /getting to insects

1

(b) catching insects / food / insects

stick to the tongue

1

(c) hear insects / predators

1

(d) stop soil / dust / insects getting in

1

[4]

Q37.

(a) camouflage / less visible

ignore insulation

1

(b) insulates / keeps warm

allow keeps out cold

ignore camouflage

1

(c) prey can't hear it / help catch prey / cannot hear it so isn't scared away

ignore predation on owl

1

(d) catching / eating / killing prey / perching / defence

1

[4]

Q38.

(a) both plots correct

1

suitable line of best fit

1

(b) allow range of 3−7 (units)

*allow ecf from line of best fit given in **03.1***

1

(c)

Advantage	Disadvantage
	✔
✔	
	✔

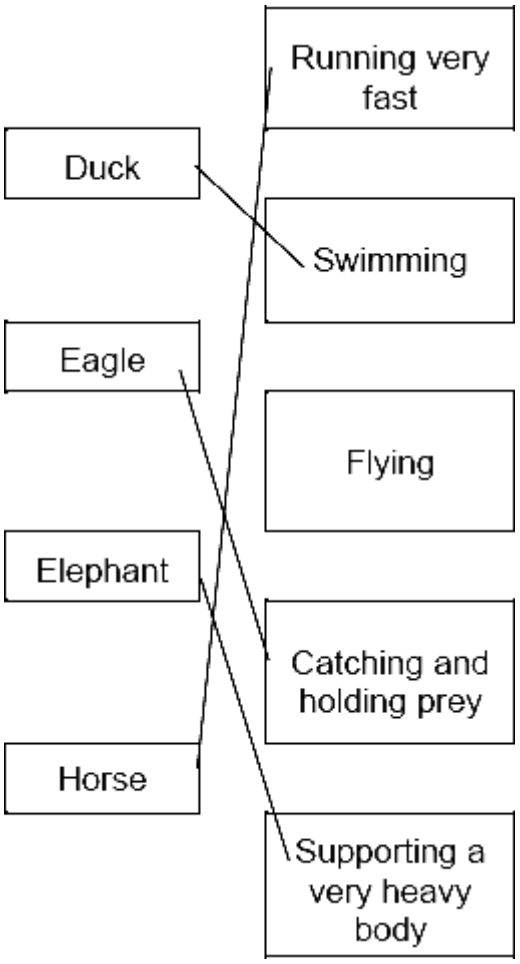
*allow **1** mark for 2 correct*

2

more than one tick in a row negates a mark

[5]

Q39.



*all four correct = **4** marks*
*three correct = **3** marks*
*two correct = **2** marks*
*one correct = **1** mark*
extra line from a statement cancels the mark

[4]

Q40.

(a) (i) carbon dioxide

1

(ii) sulfur dioxide

1

(b) (i) reduces land available for animals and plants

1

(ii) metals

1

(c) (i) pesticide

1

(ii) kill other animals

1

[6]

Q41.

(a) large area

allow thin / large / big / flat / light

allow adaptations that cannot be seen eg internal air spaces

1

(b) (shape means that) snow falls off

1

(c) protect / stop it being eaten

1

(d) stores/ absorbs water (from other parts of the plant)

ignore absorbs water from soil / air

ignore nutrients

1

[4]

Q42.

(a) (i) 70

*award **2** marks for correct answer irrespective of working*

*allow **1** mark for 30 + 10 + 24 + 6 (with wrong answer or no answer), do **not** award this sum if other figure(s) are included in the addition*

2

(ii) 6

*award **2** marks for correct answer irrespective of working*

*award **2** marks for correct answer to (a)(i) – 64 (ecf)*

*award **1** mark either for 70 – 64 or answer to (a)(i) – 64 with no answer or incorrect answer*

2

(b) photosynthesis.

1

[5]

Q43.

(a) 60

*correct answer gains **2** marks*

*if answer incorrect evidence of using 40 gains **1** mark*

2

(b) any **two** from

ignore temperature rise / global warming

- climate change / described e.g. hotter summers / drought / seasons change
- rise in sea levels / flooding

  allow other environmental effects
- glacier melting / ice caps melting
- forest fires
- habitat destruction

- effect on organisms
- eg extinction / migration

2

[4]

Q44.

(a) brown (colour)

1

(b) (long) ears

1

(c) (long) horns

1

(d) (white) ring

1

[4]

Q45.

(a) *answer to be marked as a whole*

has thorns / prickles / points

accept sharp points

1

(these) hurt animal

allow frighten animal

***only** accept prevent animal eating leaves if qualified by 'hurting' or 'frightening'*

1

(b) *answer to be marked as a whole*

camouflaged / looks like twig / disguised

allow blends in

ignore too small to see

1

(animal) cannot **<u>see / detect</u>** / recognise it

allow animal does not eat twigs

***only** accept prevents animal eating it if qualified by 'seeing' or 'wrong food'*

1

(c) *answer to be marked as a whole*

red / colour

1

warns that insect might be poisonous / dangerous

allow inedible / tastes bad

1

[6]

Q46.

any **three** from:

ignore references to carbon cycle

accept digested / decomposed / broken down / rotted for decay throughout

ignore eating

- dead leaves / flowers / bluebells are decayed
- idea that microorganisms do the decaying

  accept microbes / bacteria / fungi / mould / decomposers for microorganisms
- minerals / ions / nutrients / named released (by decay / microorganisms)

  ***not** mineral ions unqualified*
- (released) into soil **or** minerals / ions / nutrients taken up / in by (bluebell) roots (next year)

  look for idea that minerals / ions / nutrients are in soil (eg released into soil or taken up from soil)

3

[3]

Q47.

(a) C

1

(b) B

1

(c) E

1

(d) D

1

(e) F

1

[5]

Q48.

(a) genes

1

chromosomes

1

(b) (i) higher yield

1

less use of pesticides

1

(ii) any **two** from:

- uncertain about effects on health

- fewer bees
- might breed with wild plant
- seeds only from one manufacturer

2

[6]

Q49.

(a) chose places <u>randomly</u>

1

method of obtaining randomness, e.g. (grid and) random numbers

allow thrown qualified e.g. over shoulder, eyes shut

allow max 1 for mention of a transect with sampling at regular or random intervals

1

(b) (i) 7 **or** 8

allow fractions / decimals between 7 and 8

1

(ii) count number of whole squares and add estimate of area covered by part squares

allow reference to counting squares with ½ cover or more

allow clear working on diagram and / or (b)(i)

1

(iii) 28 – 32 (in range)

allow ecf

*if answer incorrect allow **1** mark for reasonable reference to divided by 25 or multiplied by 4*

2

(c) nutrients / minerals / ions / fertiliser / water

allow light / pH / trampling / soil texture / grazing / mowing / weed killer / where seeds originally fell

ignore pollution / soil / competition if unqualified

ignore temperature / wind

1

[7]

Q50.

(a) 40 – 60 hours

1

(b) (i) decrease

1

1st slowly then faster / appropriate detail from the graph – e.g. from 7.8 to 0 / faster after 4 – 10h

1

(ii) oxygen after glucose

extra box ticked cancels 1 mark

1

oxygen less than glucose

1

(iii) respiration

1

[6]

Q51.

(a) looks like a leaf

1

so predator less likely to / won't <u>see it</u>

allow 'camouflage' as alternative to either point

1

(b) (i) thorns (of acacia tree) hurt (predators)

*allow idea that fewer animals / predators live in trees **or** ground living animals can't reach them (in the trees)*

1

(ii) (giraffe) avoids being bitten by ants

allow ants are poisonous / have unpleasant taste

1

(c) looks like / mimics a wasp **or** has warning colouration

1

so predators think it has a sting

1

[6]

Q52.

(a) (i) any **two** from:

ignore oxygen / food / sun / carbon dioxide

- light
- water
- space
- nutrients / ions / minerals / named

*accept two named minerals / ions for **2** marks*

2

(ii) less competition for water

ignore space / light / food

or

more water / nutrients / minerals available

1

(b) camouflage / same shape as leaf / looks like a leaf

allow 'blends in'

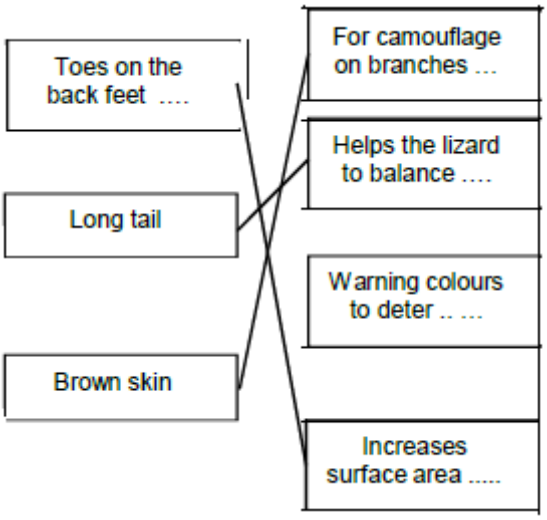
ignore colour

1

[4]

Q53.

(a)



one mark for each line

*do **not** award mark for an adaptation if lines are drawn from it to more than one advantage*

3

(b) escape (predators)

accept faster than swimming

allow chase prey

allow it stops them from drowning

1

(c) food

1

territory

1

*deduct **one** mark for each tick in excess of two*

[6]

Q54.

(a) place all the quadrats randomly on the lawn

1

(b) (i) 1 4

2 2

3 2

4 0

all 4 counts correct

1

Total = 15

total correct for their figures

1

(ii) 1.5

allow ecf from (b)(i)

1

(iii) 180

correct answer with or without working

*if answer incorrect, allow **1** mark for* $\frac{15}{10}$ *x 120* ***or*** *15 x 20*

or $\frac{15}{10}$ *x 12 x 10*

or *1.5 x 12 x 10* ***or*** *1.5 x 120*

allow ecf from (b)(ii)

*allow **1** mark if only 1 error*

2

(c) use a larger sample size / more quadrats

ignore repeats but allow repeat in different places

ignore 'count them all'

or

use bigger quadrats

1

[7]

Q55.

(a) the variety of different species on Earth

1

(b) carbon dioxide

1

methane

1

(c) any **two** from:

- drought
- flooding
- temperature change

  allow temperature increase or decrease
- rainfall change

  allow rainfall increase or decrease

2

[5]

Q56.

(a) Photosynthesis

1

(b) Respiration

1

(c) **C**

1

(d) (it will) rise

1

(e) water vapour

1

methane

1

(f) Microorganism

1

[7]

Q57.

(a) Leaf

1

(b) Beetle

1

(c) Community

1

(d) Light intensity

1

Wind direction

1

[5]

Q58.

(a) any **three** from:

- place 30-m tape measure across field / from one wood to the other
- place quadrat(s) next to the tape
- count / record the number / amount of dandelions / plants in the quadrat

  ignore 'record the results'

  ignore measures / estimates dandelions
- repeat every 2 metres

  allow every metre / at regular intervals

3

(b) (i) low light / it is shady

allow no light

ignore sun / rays

or

not enough water / ions / nutrients

accept correct named ion

ignore no water / ions / nutrients

or

wrong pH of soil

accept competition with trees for light / water / ions

ignore competition for space and competition unqualified

accept soil too acidic / too alkaline

ignore temperature

1

(ii) sensible suggestion for a small area, eg chance variation / anomaly / poisoned by animal waste / wrong pH of soil / eaten (by animals) / cut down / footpath

1

(c) repeat (transect) / compare with the results of other groups

allow 'do it in two different locations' for 2 marks

1

at different / random location(s) / elsewhere (across the field)

*do **not** allow 'in other fields'*

1

[7]

Q59.

(a) an extremophile species

1

(b) (i) smaller ice area

allow smaller amount of ice

allow less ice

1

(so) less habitat

allow fewer places to live / nest

1

(ii) **either** increase
as more sea to live in
or
as less competition for food

or decrease
as less space (ice) to lay eggs
or
predators more likely to eat them

there is no mark for increase / decrease alone. The mark is for an appropriate reason linked to increase / decrease

if increase / decrease not ringed the mark may be awarded if it is clear in the explanation which is intended

1

(c) Living organisms show long-term changes.

1

[5]

Q60.

(a) Place more quadrats in the field

1

Place quadrats randomly

1

(b) 26 400

1

(c) transect

1

(d) as distance from the path increases the number of (ribwort) plants increases

1

steep rise from 0.5 to 3.0 between 2 and 4 m from path **or** numbers level off to about 4 plants from 10 m from the path

1

(e) The ribwort plants get walked on

1

[7]