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. _________________________________________________________________
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. _________________________________________________________________

(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

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?

(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

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

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

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

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?

_____________________________________________________________________

(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. _________________________________________________________________
   ___________________________________________________________________

(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 ____________________________

(Total 4 marks)

Q7.
The greenfly is an insect which is eaten by ladybirds.

(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.

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. _________________________________________________________________
___________________________________________________________________

(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. _________________________________________________________________

(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

<table>
<thead>
<tr>
<th>acid rain</th>
<th>carbon dioxide</th>
<th>the greenhouse effect</th>
<th>methane</th>
<th>sulphur dioxide</th>
</tr>
</thead>
</table>

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 ___________________________________.

(b) Burning fossil fuels also causes pollution.

Name one fossil fuel.
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.

___________________________________________________________________

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

1. _________________________________________________________________

___________________________________________________________________

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. _________________________________________________________________

(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.
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________

(Total 5 marks)

Q12.
The drawing shows a plant that is adapted to life in a hot, dry desert.
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.
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.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

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

________________________________________________________________________

(Total 4 marks)
Q16.
The diagram shows a village and its surroundings.

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

<table>
<thead>
<tr>
<th>oxygen</th>
<th>pesticides</th>
<th>sewage</th>
<th>sulphur dioxide</th>
</tr>
</thead>
</table>

The air might be polluted by ______________ from the industrial site.
The river might be polluted by ______________ from the village and
by ______________ from the farmland.

(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.

___________________________________________________________________
___________________________________________________________________

(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.
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. ________________________________________________________________

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.

___________________________________________________________________
___________________________________________________________________

(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.

___________________________________________________________________
___________________________________________________________________

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. ____________________________________________________________

(ii) The drawing shows a creosote bush.

This bush lives in a desert.

[Image of a creosote bush]

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?

______________________________________________________________

______________________________________________________________

(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.

___________________________________________________________________

___________________________________________________________________

___________________________________________________________________

___________________________________________________________________

___________________________________________________________________

___________________________________________________________________

___________________________________________________________________
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. ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

(QTotal 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.
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.
(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. 

(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.
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 and Y](image.jpg)

(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 ____________________________________________________

(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.

(ii) What percentage of moths of type X was recaptured in:
the polluted woodland; __________________________________________
the unpolluted woodland? ________________________________________

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

(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

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

(Total 7 marks)
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

(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

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

Draw a ring around one answer.

- decrease
- increase
- stay the same

(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. _________________________________________________________________
   ___________________________________________________________________

(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.

<table>
<thead>
<tr>
<th>Herbicide added in kg per hectare</th>
<th>Amount of rice produced in tonnes per hectare</th>
<th>Percentage cover of weeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>50</td>
<td>85</td>
</tr>
<tr>
<td>1.7</td>
<td>70</td>
<td>32</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th></th>
<th>Polar bear</th>
<th>Malayan sun bear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour of fur</td>
<td>White</td>
<td>Black</td>
</tr>
<tr>
<td>Thickness of fur in cm</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Thickness of fat layer under skin in cm</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>Surface area compared to body size</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of lynx in thousands</th>
</tr>
</thead>
<tbody>
<tr>
<td>1918</td>
<td>45</td>
</tr>
<tr>
<td>1920</td>
<td>25</td>
</tr>
<tr>
<td>1922</td>
<td>10</td>
</tr>
<tr>
<td>1924</td>
<td>20</td>
</tr>
<tr>
<td>1926</td>
<td>40</td>
</tr>
<tr>
<td>1928</td>
<td>50</td>
</tr>
</tbody>
</table>

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.

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

_____________________________________ thousand

(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

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

   ________________________________________________________________
   ________________________________________________________________

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

   ________________________________________________________________
   ________________________________________________________________

(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 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

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

Tick one box.

- Communities
- Predators
- Prey
- Producers
(c) Figure 3 and Figure 4 show how the moose population and the wolf population changed in one area.

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.

___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________

(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.

(ii) This theory was suggested by a scientist called Charles Darwin Lamarck Semmelweiss.

(iii) This scientist said that all living things have evolved from monkeys dinosaurs simple life forms.

(d) Many religious people oppose the theory of evolution.
Give one reason why.

___________________________________________________________________
___________________________________________________________________

(Q1) (Total 8 marks)

Q33.
The drawings show some woodland and some farmland. Both have a river flowing through.

Woodland

Farmland

River

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

Give one reason why.

___________________________________________________________________
___________________________________________________________________

(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. ____________________________________________________________

___________________________________________________________________

(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, or pesticides.
(ii) To kill insects that feed on the crop, farmers use fertilisers, herbicides, and pesticides.

(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.

______________________________________________________________
______________________________________________________________

(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. ____________________________________________________________________
   ____________________________________________________________________

(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.
What area of forest is being lost in Africa each year?

Area = _______________________ thousand km$^2$

(i) 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 km$^2$

Step 2 Calculate the total area of trees planted.

______________________________________________________________

Total area planted = __________ thousand km$^2$

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 km$^2$

(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.
Q35.

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

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?

___________________________________________________________________

___________________________________________________________________

___________________________________________________________________

(b) Complete the sentences.

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

___________________________________________________________________

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

theory of ________________________

(Total 3 marks)
Q36.
The photograph shows an aardvark.

- 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.

___________________________________________________________________
Q37.  
The photograph shows a snowy owl.

- 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.

___________________________________________________________________
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>
<thead>
<tr>
<th>Year</th>
<th>Mass of peat used as a fuel in units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>110</td>
</tr>
<tr>
<td>1995</td>
<td>80</td>
</tr>
<tr>
<td>2000</td>
<td>50</td>
</tr>
<tr>
<td>2005</td>
<td>20</td>
</tr>
<tr>
<td>2010</td>
<td>10</td>
</tr>
</tbody>
</table>

Figure 1 shows some of the information from Table 1.
(a) Complete Figure 1 by plotting the points for 2005 and 2010.

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

Use information from Figure 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](https://via.placeholder.com/150)

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>
<thead>
<tr>
<th>Feature compared to peat compost</th>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coconut fibre is transported longer distances</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coconut fibre is a waste product</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coconut fibre traps less air in the soil, so roots absorb fewer mineral ions</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Photograph</th>
<th>Adaptation</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Feet 1" /></td>
<td>Running very fast</td>
</tr>
<tr>
<td><img src="image2" alt="Feet 2" /></td>
<td>Swimming</td>
</tr>
<tr>
<td><img src="image3" alt="Feet 3" /></td>
<td>Flying</td>
</tr>
<tr>
<td><img src="image4" alt="Feet 4" /></td>
<td>Catching and holding prey</td>
</tr>
<tr>
<td><img src="image5" alt="Feet 5" /></td>
<td>Supporting a very heavy body</td>
</tr>
</tbody>
</table>

(Total 4 marks)

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

(i) The gas which causes global warming is

- carbon dioxide.
- oxygen.
- sulfur dioxide.

(ii) The gas which causes acid rain is

- methane.
- oxygen.
- sulfur dioxide.

(b) The photograph shows a quarry.
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.

(ii) Quarrying can be reduced by recycling metals.
paper.
plastic

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

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.

(ii) The chemical in the spray might also

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

(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.

___________________________________________________________________
___________________________________________________________________

(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)
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.

<table>
<thead>
<tr>
<th>Mass of carbon dioxide exchanged with the atmosphere in millions of tonnes</th>
<th>Passed out into the atmosphere</th>
<th>Taken in from the atmosphere</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants</td>
<td>30</td>
<td>64</td>
</tr>
<tr>
<td>Animals</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Microorganisms</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>Combustion</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

(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  

(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  

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

Plants use carbon dioxide in the process of ____________.

decomposition. photosynthesis.
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 = _________________________

(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. _________________________________________________________________
___________________________________________________________________

Q44.
The photograph shows some features of a waterbuck.

Waterbuck live in areas of tall, brown grass.
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?

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

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

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

(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.
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.

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

Adaptation

___________________________________________________________________

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

Q46.

In a woodland, bluebells grow well every year.

**Bluebells growing well in woodland**
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.

<table>
<thead>
<tr>
<th>roots</th>
<th>dead leaves</th>
<th>mineral ions</th>
</tr>
</thead>
<tbody>
<tr>
<td>microorganisms</td>
<td>decay</td>
<td></td>
</tr>
</tbody>
</table>

(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

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

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

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

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

(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.

<table>
<thead>
<tr>
<th>clones</th>
<th>chromosomes</th>
<th>embryos</th>
<th>genes</th>
</tr>
</thead>
</table>

GM crops are produced by cutting ______________________ out of the
of one plant and inserting them into the cells of a crop plant.

(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. ____________________________________________________________

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

1. ____________________________________________________________
2. ____________________________________________________________

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.
(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 = _______________

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

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

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

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

Answer = ________________________________ %

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

_________________________________________________________________

(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.

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

Draw a ring around one answer.

distillation  filtration  respiration

Q51.

Many organisms are adapted to avoid being eaten.

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

![Gecko on leafy branch](https://via.placeholder.com/150)

The gecko is adapted to avoid being eaten by predators.

Explain how.

___________________________________________________________________

___________________________________________________________________

___________________________________________________________________

___________________________________________________________________

___________________________________________________________________

(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.

(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.

<table>
<thead>
<tr>
<th>Wasp</th>
<th>Hoverfly</th>
</tr>
</thead>
</table>

Wasps have stings, but hoverflies do not.
The stripes on the hoverfly help the hoverfly to avoid being eaten by predators. Explain why.

___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________

(Q2) (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?
___________________________________________________________________

(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?
___________________________________________________________________
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.

<table>
<thead>
<tr>
<th>Adaptation</th>
<th>Advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toes on the back feet are webbed</td>
<td>Helps the lizard to balance when running</td>
</tr>
<tr>
<td>Long tail</td>
<td>Warning colours to deter predators</td>
</tr>
<tr>
<td>Brown skin</td>
<td>Increases surface area in contact with the water</td>
</tr>
</tbody>
</table>

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

(c) Animals, such as lizards, compete with each other.
Give two factors that animals compete for.

Tick (✓) two boxes.

<table>
<thead>
<tr>
<th>Factor</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen</td>
<td></td>
</tr>
<tr>
<td>Food</td>
<td></td>
</tr>
<tr>
<td>Territory</td>
<td></td>
</tr>
<tr>
<td>Light</td>
<td></td>
</tr>
</tbody>
</table>

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.

(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.

<table>
<thead>
<tr>
<th>Quadrat number</th>
<th>Number of thistle plants in each quadrat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

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

______________________________________________________________
Mean = ______________________________________________

(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 = _______________________

(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

(1)
(c) Give two effects of global warming that could reduce biodiversity in an area.
1. _________________________________________________________________
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.
(b) In process B, carbon dioxide is released from plants and animals into the atmosphere.

What is process B?
Tick one box.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Burning</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Feeding</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Photosynthesis</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Respiration</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(d) What will happen to the concentration of carbon dioxide in the atmosphere if lots of trees are cut down?
(e) Greenhouse gases cause global warming.
Carbon dioxide is a greenhouse gas.
Name two other greenhouse gases.
1. _________________________________________________________________
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?

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

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

Figure 3

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

Use information from Figure 1.

___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
(b)  

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

________________________________________________________________________________________
________________________________________________________________________________________

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

________________________________________________________________________________________
________________________________________________________________________________________

(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.

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

(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 |

(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.
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.

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

(ii) Suggest what has happened to the number of chinstrap penguins since 1965. Draw a ring around your answer. **increase / decrease**
(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.

(Total 5 marks)

Q60.

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

The student used the apparatus shown in 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

(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.

\[
\text{Total number of ribwort plants} = \text{______________}
\]

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

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

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

\[
\text{______________}
\]

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

**Q2.**
(a) two thirds/66%  
*for 1 mark*  

(b) 2 of:  
by sewage  
by chemicals fertilizers  
*any 2 for 1 mark each*  

**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  

(b) herbicides  

**Q4.**
(a) **1960 or 1961**  

(b) birth rate  
*accept reproductive rate*
(c) (i) 1963

(ii) Fin go down
      Sei go up
      both are required for the mark to be given

(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

Q5.

(a) predator
    prey
    no alternatives
    for 1 mark each

(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
(c) idea that wasps die out/die off/fly away/migrate/leave greenhouse but NOT ‘die’ alone

for 1 mark

1

Q6.

(a) B plants are:
taller
smaller/thinner leaves
thinner stem or vice versa in referring to A plants

any two for 1 mark each

2

(b) water/rain/moisture
nutrients/any specific mineral (N/P/K)

each for 1 mark

2

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

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
(b) light
water
space
nutrients
(allow up to 2 named substances e.g. CO₂/O₂/NO₃)
any 3 for 1 mark each

Q9.
(a) carbon dioxide
methane
greenhouse effect

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

Q10.
(a) any one from
big, flat feet
long eyelashes
long hair around openings to its ears

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

(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

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

(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

Q12.
(a) (long) roots

(b) prevents water from evaporating
accept to reduce/stop water loss

Q13.
any three from
building
accept building of houses, roads, power stations
quarrying
farming
‘dumping’ waste

Q14.
camouflage (when hunting)
accept the idea that the white coat prevents the prey or predator ‘seeing’ the Arctic fox

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
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

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

Q17.  
(a) habitats destroyed
accept idea that the places to live or food or minerals are reduced or less shelter

(b) any two from

fertilisers / named fertilisers
accept sewage / lime

pesticides

herbicides

Q18.
(a) long hind legs / muscular hind legs / bent hind legs
accept powerful hind legs
accept back legs act as spring

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

Q19.
(a) (i) any two from:

list principle

• light
ignore oxygen / food / sun

• water

• space

• nutrients / ions / minerals / named

• carbon dioxide / CO₂

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

or

more water / nutrients / minerals available

(b) camouflage / same shape as leaf / looks like a leaf
allow ‘blends in’
ignore colour
Q20.

(a) 
(i) traps air

*note ‘keeps warm’ is stem*

(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

(ii) **increases** insulation

*do not accept keep warm*

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

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

accept uses more glucose or respires more

*do not* credit small surface area

and

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

generates more heat

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

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

any one from:
prevents predation
aids hunting

*accept this idea in own words*

(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)

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)

Q22.

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

do not accept ‘logs’ by itself

(ii) farming/agriculture
or
building
or
roads

(iii) increased CO₂

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

accept burning trees (1)

trees/photosynthesis uses carbon dioxide
releases CO2 (1)

lets in heat/energy
\textit{do not accept sunshine} (1)

prevents it escaping (from the atmosphere)
or
being reflected/retransmitted into space (1)

(ii) global warming
\textit{accept increased ‘el nino’} (1)

or
a named effect of global warming such as polar ice cap melt,
climatic change, increased temperature/sea level rising
\textit{accept warmer weather} (1)

Q23.
(a) any \textbf{two} from:
\begin{itemize}
  \item streamlined / shape reduces friction / long and thin / smooth surface
    OWTTE
  \item fins / flippers / tail / paddle
    \textit{do not accept ‘arms’ or ‘legs’}
  \item structures that push against water
\end{itemize}

(b) (i) any \textbf{two} from:
\begin{itemize}
  \item fossil has hind limb / legs / feet
    \textit{it = minke}
    \textit{accept any valid comparison}
  \item fossil has more ribs / bones
  \item fossil has teeth
  \item fossil has curved spine
\end{itemize}

(ii) billion
\textit{give evidence for} (1)

Q24.
(a) X (no mark)
X is more visible or Y is more camouflaged

(b) (i) so camouflage not changed or so not easier to see
(ii) 25
(iii) any **one** from:
   • eaten (by birds) / died
   • mixed in with large number of unmarked moths
   • moved away

(c) (i) DNA
(ii) the **gene** / **allele** for being dark / dominant

Q25.

(a) (i) carbon dioxide
   
   *accept other positive indications*

(ii) methane
   
   *accept other positive indications*

(b) increase
   
   *accept other positive indications*

(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

Q26.

(a) (i) increases 1

(ii) decreases 1

(b) any two from:

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

 accept correct named example
*do not* accept food
*do not* accept all

2

(c) kills / harms other / named organisms 1

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
*number must be comparative*
*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

1

(re body size)
Q28.

(a) points plotted accurately

\[ \frac{1}{2} \text{ square} \]

*deduct 1 mark per error*

*ignore the line*

(b) 30 or correct from candidate’s graph

accept 30 000 lynx

do not accept 30 000

(c) (i) fall

*mark (i) and (ii) separately*

(ii) fewer hares or lack of food

*do not accept no hares or food*

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

*must have the eat and kill for the point*

Q29.

(a) (i) conserves water owtte

(ii) prevents overheating / keeps cool

*allow cooler at night*

*allow safety from predators*

(iii) increases heat loss / cooling

*allow prevents sinking into sand*

(b) animal could overheat owtte

Q30.

(a) producer

(b) predators

(c) 1200
(d) 2 (years)
(e) there is more food for wolves
(f) humans hunting viruses

Q31.
(a) fuel / houses / paper
   allow any object made from wood
   farming / agriculture / replanting
   allow roads / homes / factories
   carbon dioxide / greenhouse gas / pollution or relative named pollutant
   warming / temperature increase
(b) (i) none of species left / died out
(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

Q32.
(a) protection / defence
   ignore insulation or rolls into a ball
   ignore camouflage
   from predators / from being attacked / from being eaten
(b) looks like snake / looks scary
   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
(c) (i) natural selection

(ii) Darwin

(iii) simple life forms

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

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

(ii) any two from:
• building / houses / factories / etc
ignore timber / uses of wood
• roads
• quarrying
• waste dumps / landfill
• grazing

(b) (i) fertilisers

(ii) pesticides

(iii) pesticide / herbicide / chemicals / sprays
allow river (through farmland) polluted
allow correct effect of fertilisers on river organisms

(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

Q34.
(a) (i) 40
   
   accept -40 or +40

(ii) Step 1 92

   Step 2 18

   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

(b) (i) both animals and plants

   (ii) microorganisms

   (iii) carbon dioxide

Q35.
(a) warmer / dryer
   allow greenhouse effect / global warming
   ignore wind

(b) (i) genes / alleles / chromosomes / DNA / genetic material / genetics
   allow inheritance
   allow nutrition / food / metabolism / growth rate
   ignore environment

(ii) natural selection / evolution
   allow survival of the fittest

Q36.
(a) digging / getting to insects

(b) catching insects / food / insects
stick to the tongue

(c) hear insects / predators

(d) stop soil / dust / insects getting in

Q37.
(a) camouflage / less visible
   ignore insulation

(b) insulates / keeps warm
   allow keeps out cold
   ignore camouflage

(c) prey can’t hear it / help catch prey /
   cannot hear it so isn’t scared away
   ignore predation on owl

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

Q38.
(a) both plots correct

suitable line of best fit

(b) allow range of 3–7 (units)
   allow ecf from line of best fit given in 03.1

(c)

<table>
<thead>
<tr>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

allow 1 mark for 2 correct

more than one tick in a row negates a mark

Q39.
Q40.
(a) (i) carbon dioxide
(ii) sulfur dioxide

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

(c) (i) pesticide
(ii) kill other animals

Q41.
(a) large area

allow thin / large / big / flat / light
allow adaptations that cannot be seen eg internal air spaces

(b) (shape means that) snow falls off

(c) protect / stop it being eaten

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

ignore absorbs water from soil / air
ignore nutrients

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

(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

(b) photosynthesis.

Q43.

(a) 60

correct answer gains 2 marks
if answer incorrect evidence of using 40 gains 1 mark

(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

Q44.
(a) brown (colour) 1
(b) (long) ears 1
(c) (long) horns 1
(d) (white) ring 1

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 see / detect / 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
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 chromosomes
(b) (i) higher yield
  - less use of pesticides
(ii) any two from:
  - uncertain about effects on health
• fewer bees
• might breed with wild plant
• seeds only from one manufacturer

Q49.
(a) chose places randomly
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

(b) (i) 7 or 8
allow fractions / decimals between 7 and 8

(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)

(iii) 28 – 32 (in range)
allow ecf
if answer incorrect allow 1 mark for reasonable reference to
divided by 25 or multiplied by 4

(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

Q50.
(a) 40 – 60 hours

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

(ii) oxygen after glucose
extra box ticked cancels 1 mark
oxygen less than glucose

(iii) respiration

Q51.
(a) looks like a leaf

so predator less likely to / won’t see it
allow ‘camouflage’ as alternative to either point

(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)

(ii) (giraffe) avoids being bitten by ants
allow ants are poisonous / have unpleasant taste

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

so predators think it has a sting

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

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

or

more water / nutrients / minerals available

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

(b) escape (predators)
accept faster than swimming
allow chase prey
allow it stops them from drowning

(c) food

territory
deduct one mark for each tick in excess of two

Q54.
(a) place all the quadrats randomly on the lawn

(b) (i) 1 4
2 2
3 2
4 0
all 4 counts correct

Total = 15
total correct for their figures
(ii) 1.5

*allow ecf from (b)(i)*

(iii) 180

*correct answer with or without working*

*if answer incorrect, allow 1 mark for* \(\frac{15}{10} \times 120\) or \(15 \times 20\)

*or \(\frac{15}{10} \times 12 \times 10\)*

*or \(1.5 \times 12 \times 10\) or \(1.5 \times 120\)*

*allow ecf from (b)(ii)*

*allow 1 mark if only 1 error*

(c) use a larger sample size / more quadrats

*ignore repeats but allow repeat in different places*

*ignore 'count them all'*

*or*

use bigger quadrats

[7]

**Q55.**

(a) the variety of different species on Earth

(b) carbon dioxide

methane

(c) any two from:

- drought
- flooding
- temperature change
  
  *allow temperature increase or decrease*

- rainfall change
  
  *allow rainfall increase or decrease*

[5]

**Q56.**

(a) Photosynthesis

(b) Respiration

(c) C

(d) (it will) rise

[1]
(e) water vapour
methane

(f) Microorganism

Q57.
(a) Leaf
(b) Beetle
(c) Community
(d) Light intensity
Wind direction

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
(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
Q59.

(a) an extremophile species

(b) (i) smaller ice area
   allow smaller amount of ice
   allow less ice

   (so) less habitat
   allow fewer places to live / nest

(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

(c) Living organisms show long-term changes.

Q60.

(a) Place more quadrats in the field

   Place quadrats randomly

(b) 26 400

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

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

(e) The ribwort plants get walked on