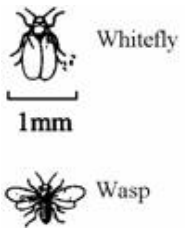
##

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**

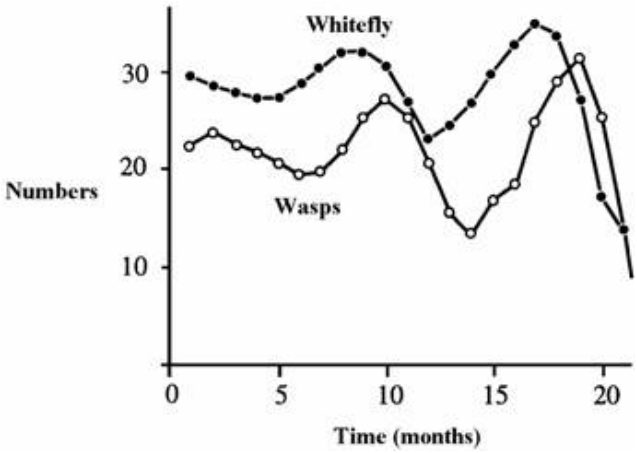
The wasp larva feeds on the whitefly larva.

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)

Q2. 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.

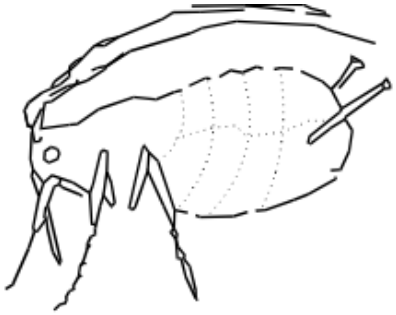
The maize plants are competing for **light**. The maize plants are also

competing for .....

and .....

(2)
(Total 4 marks)

Q3. 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)

Q4.

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.

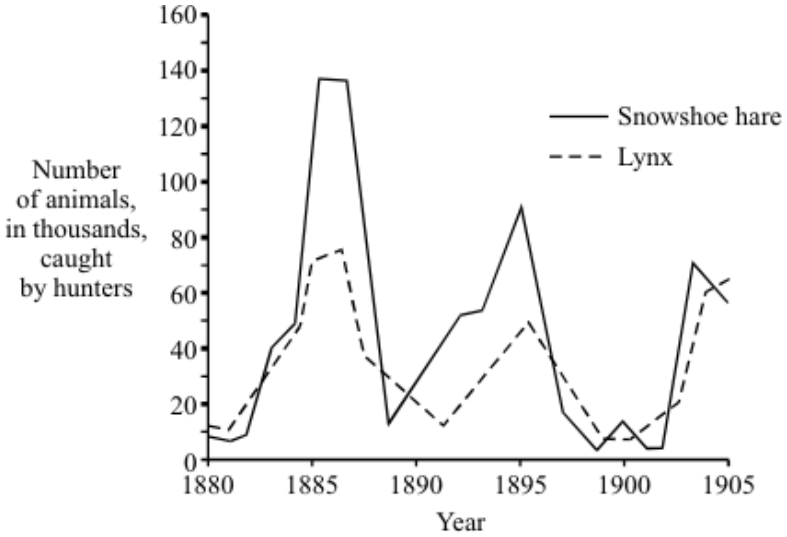
1. .....

2. .....

3. .....

(3)
(Total 5 marks)

Q5. 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.

.....

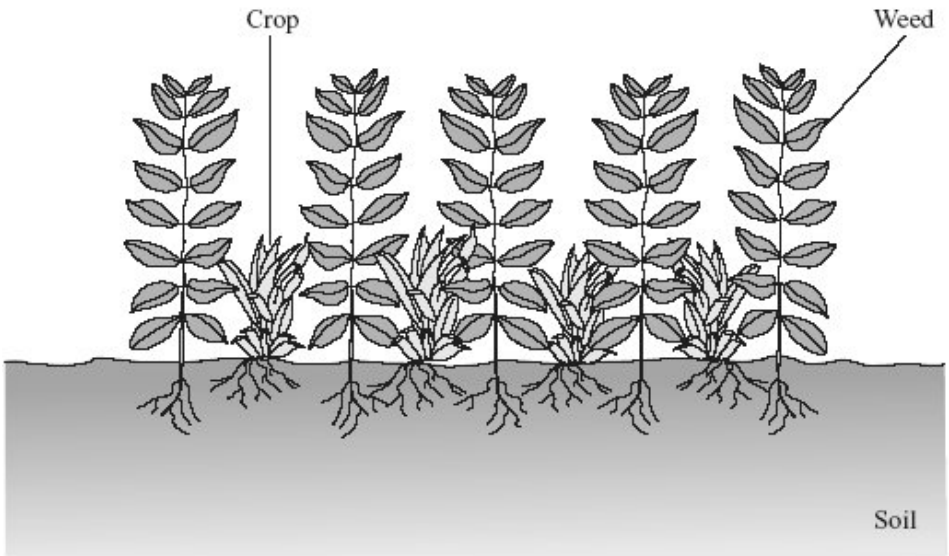
.....

.....

.....

(2)
(Total 5 marks)

Q6. 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.

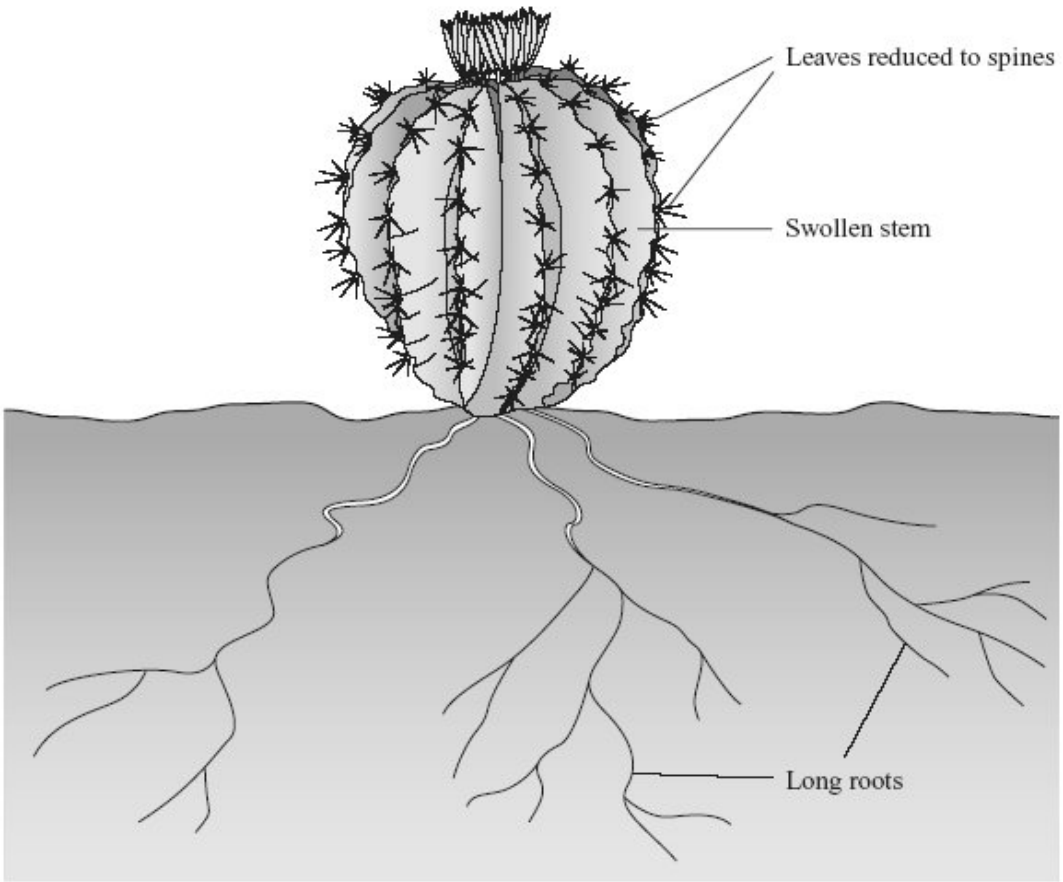
Chemicals that are used to kill weeds are called

fertilisers
herbicides
pesticides

.

(1)
(Total 4 marks)

Q7. 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)

Q8. 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 .....

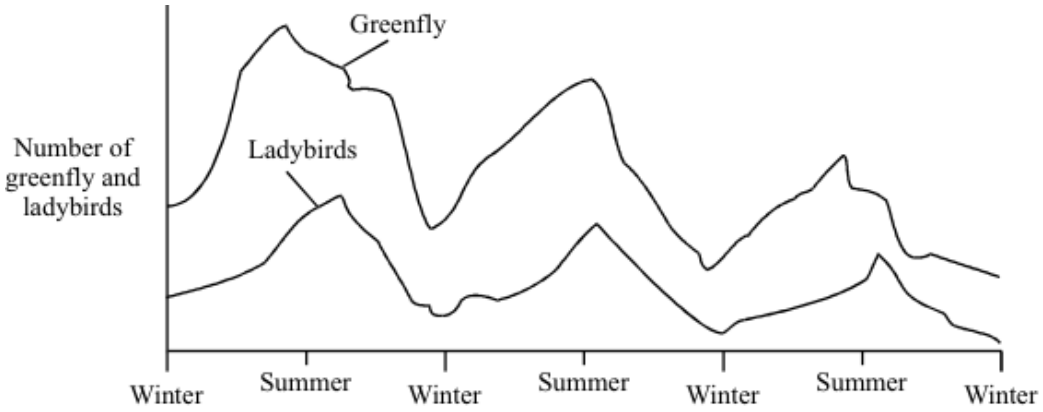
.....

2 .....

.....

(2)
(Total 4 marks)

Q9. 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)

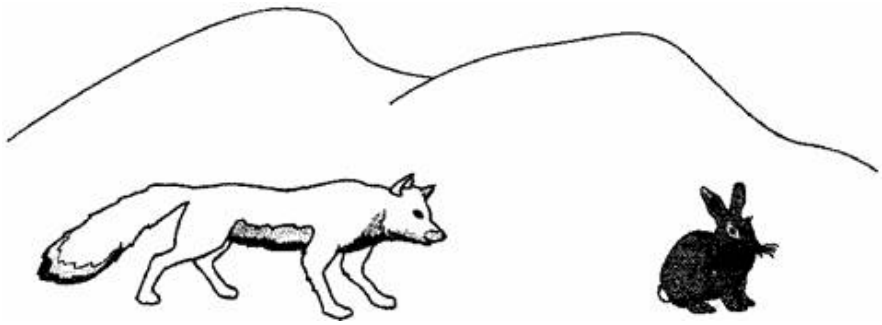
(b) Give **one** factor that limits the number of ladybirds.

.....

.....

(1)
(Total 4 marks)

Q10. 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)

Q11. 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)

Q12. 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)

##

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.

.....

.....

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.....

.....

.....

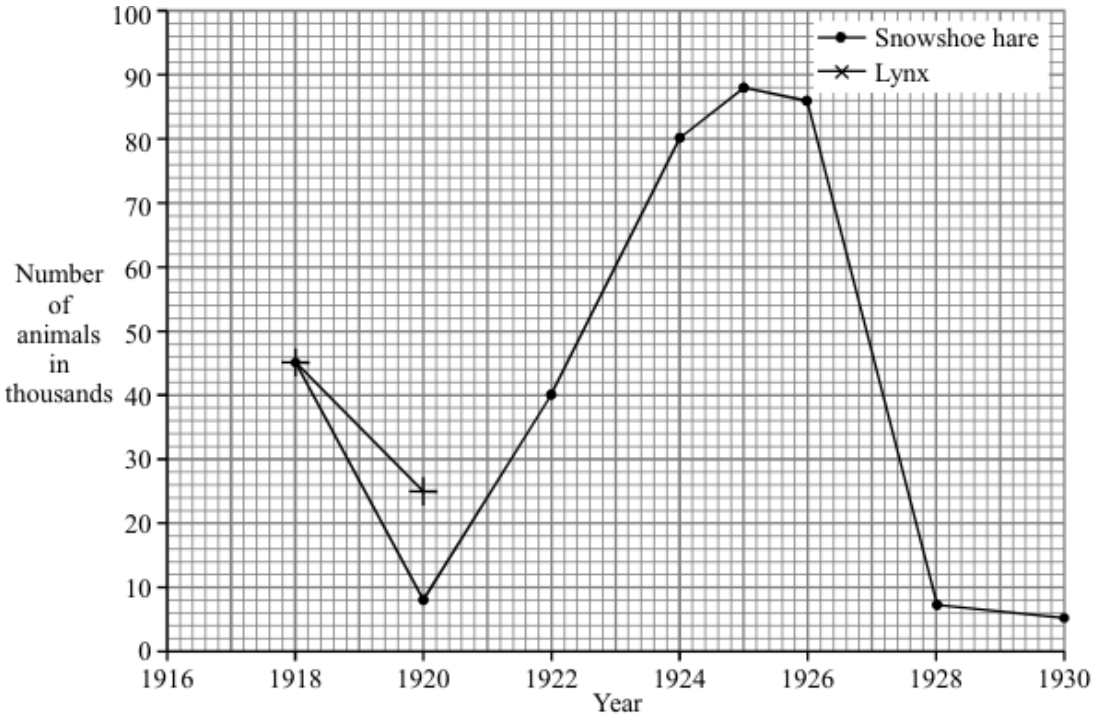
(Total 5 marks)

##

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)

Q15. 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.

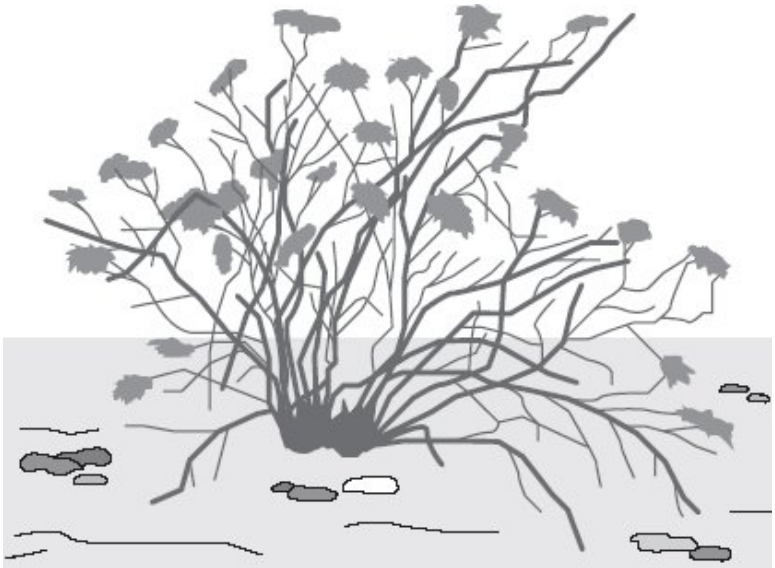
1 .....

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?

.....

.....

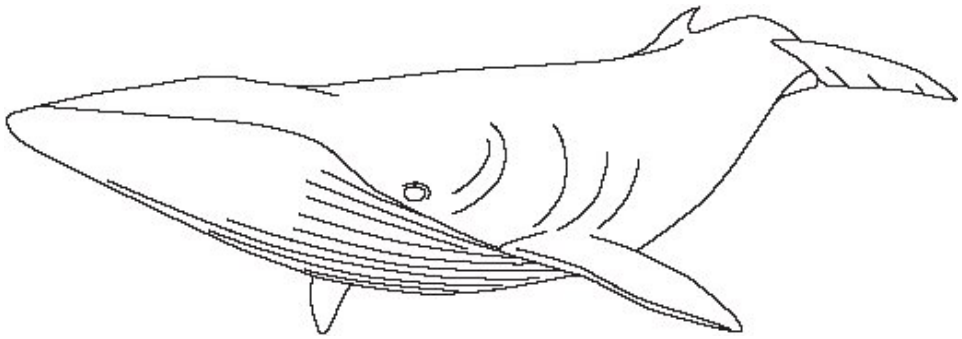
.....

.....

(1)
(Total 4 marks)

Q16. (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

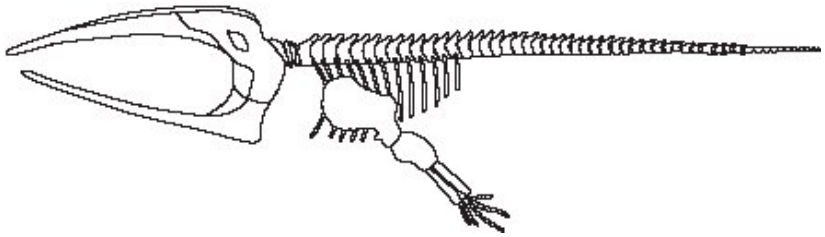
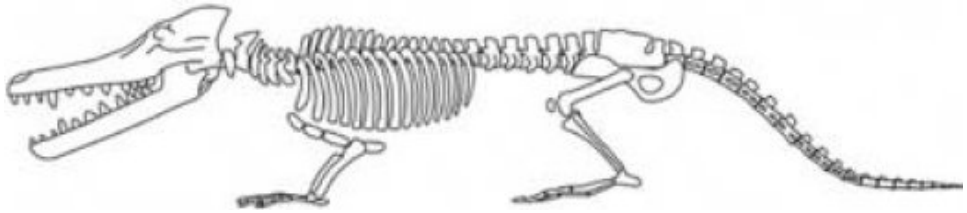


Figure 3 shows the fossil skeleton of an extinct whale.

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.

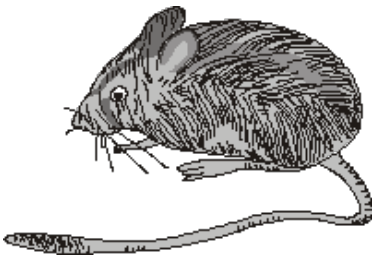
Life on Earth first developed more than three | billion / million / thousand | years ago.

Fossils | disprove / give evidence for / prove | the theory of evolution.

(2)
(Total 6 marks)

Q17. 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)

Q18. Copper compounds are found in water that has drained through ash from power stations. Invertebrate animals are used to monitor the concentration of copper compounds in water. First, scientists must find out which invertebrate animals can survive in a range of concentrations of copper compounds.

This is how the procedure is carried out.

- Solutions of different concentrations of a copper compound are prepared.
- Batches of fifty of each of five different invertebrate species, **A**, **B**, **C**, **D** and **E**, are placed in separate containers of each solution.
- After a while, the number of each type of invertebrate which survive at each concentration is counted.

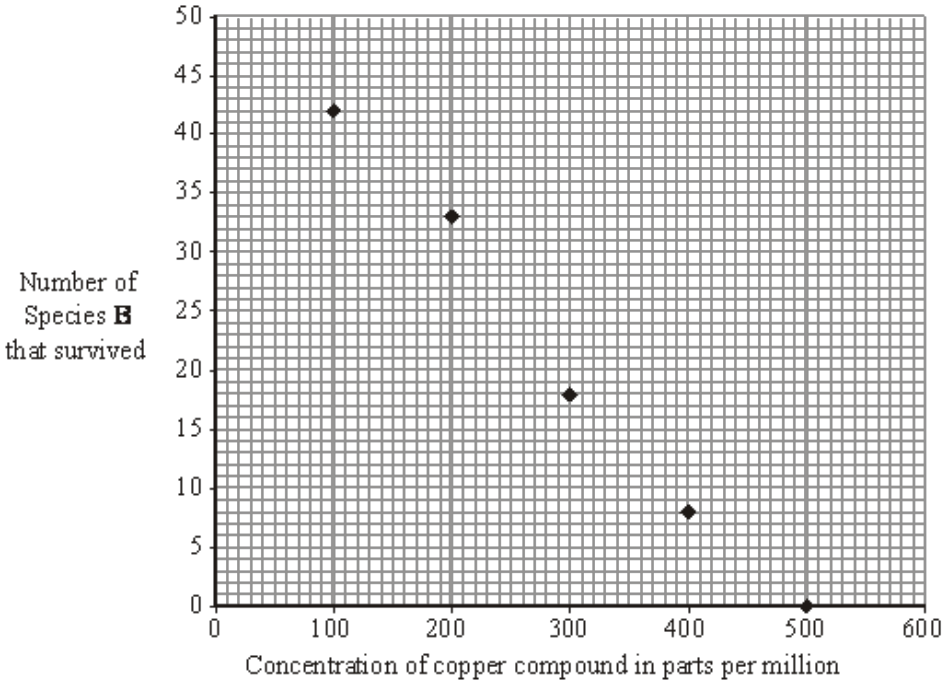
(a) Give **two** variables that should be controlled in this investigation so that the results are valid.

1 .....

2 .....

(2)

(b) The graph below shows the results for species **B**.

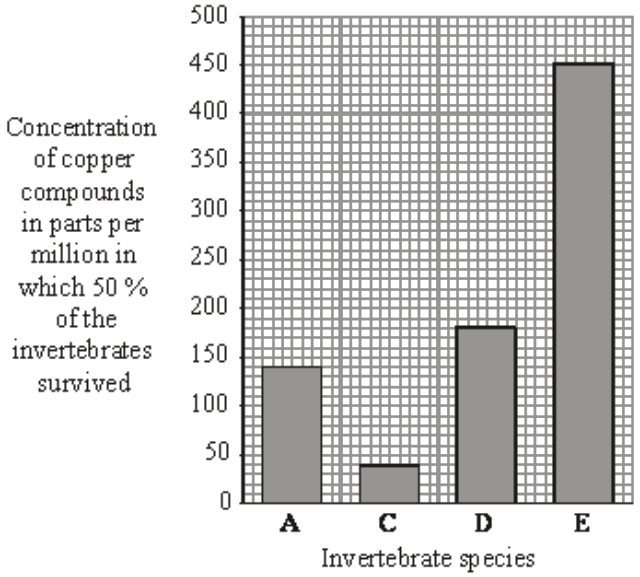


Use the graph to find the concentration of copper compounds in which 50% of Species **B** survived. To obtain full marks you must show clearly on the graph how you obtained your answer.

Concentration ..... parts per million

(2)

(c) The graph below shows the results of the tests on the other four invertebrate species.



(i) Which species, **A**, **C**, **D** or **E**, is most sensitive to the concentration of copper in the water?

.....

Give the reason for your answer.

.....

.....

(1)

(ii) It is often more convenient to use invertebrates rather than a chemical test to monitor water for copper.

Suggest **one** explanation for this.

.....

.....

.....

.....

(2)
(Total 7 marks)

Q19. 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)

Q20. Some organisms are in danger of extinction.
The photograph shows an African elephant feeding on tree leaves.

(a) Read the information about elephants and humans in Africa.

- The African elephant is the largest land animal.
- The African elephant feeds on lots of leaves.
- Adult African elephants have no natural predators.
- Elephants are killed by poachers for their ivory tusks.
- African elephants live for about 70 years.
- Most African elephants live in large herds.
- Land available to elephants is disappearing rapidly.

The African elephant is now extinct in many parts of Africa.

Use information from the list to give **three** reasons why.

1 .....

.....

2 .....

.....

3 .....

.....

(3)

(b) Organisms that are in danger of extinction can be cloned.

List A gives the names of three different cloning techniques.

List B gives information about these techniques.

Draw a line from each technique in **List A** to the correct information about it in **List B**.

List A **Technique**	**List B** **Information**
	Small groups of cells from parts of a plant are grown on a special jelly.
Adult cell cloning	
	Cells from a developing animal are separated before they become specialised and then placed into host mothers.
Embryo transplanting	
	Genes are cut out from chromosomes and inserted into other organisms.
Tissue culture	
	A nucleus is removed from an unfertilised egg cell. The nucleus from a body cell is inserted into the egg cell. An electric shock causes the egg to start to divide.

(3)
(Total 6 marks)

Q21. 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.

.....

.....

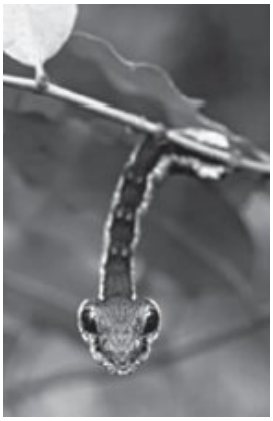
.....

.....

.....

(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.

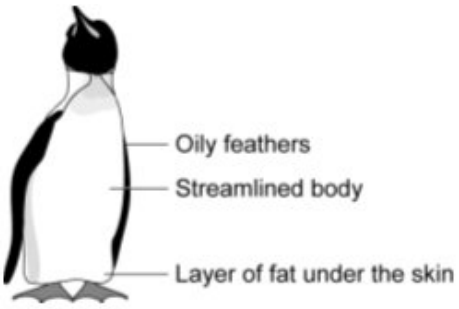
Give **one** reason why.

.....

.....

(1)
(Total 8 marks)

Q22. Emperor penguins have adaptations that help them to survive in very cold antarctic conditions.



Emperor penguins catch fish in the sea.

Use this information and information from the drawing to explain how the Emperor penguin is adapted to survive in the antarctic.

.....

.....

.....

.....

.....

.....

.....

(Total 3 marks)

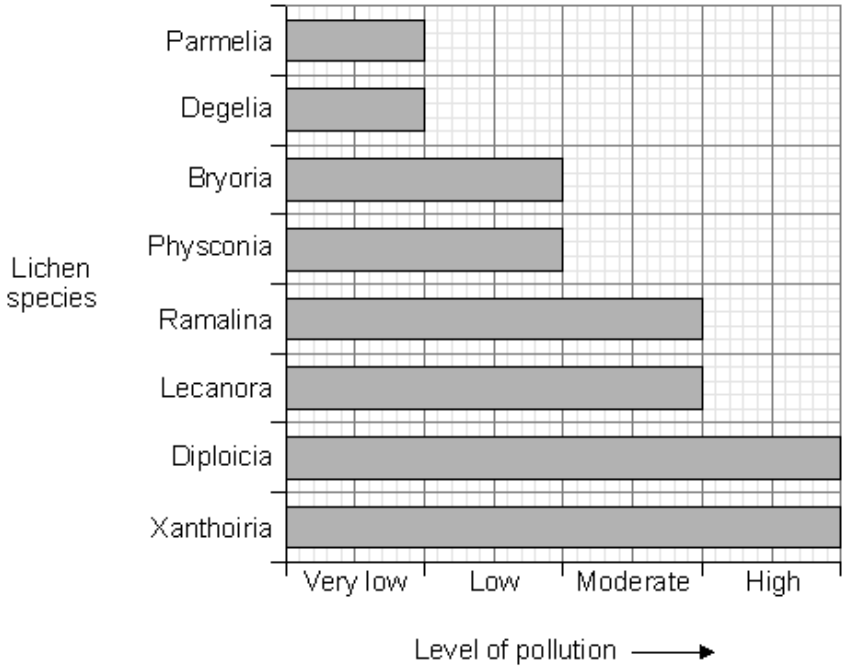
Q23. Lichens are pollution indicators.

(a) Complete the following sentence.

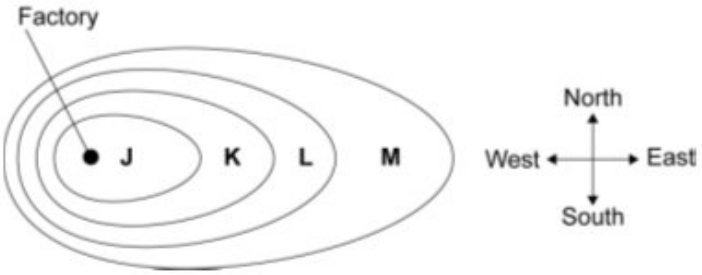
Lichens are indicators of the gas .....

(1)

The chart shows how much pollution different lichens can tolerate.



(b) The diagram shows the areas, **J**, **K**, **L** and **M**, in which different lichen species grew around a factory. The factory burns coal.



(i) In which direction does the wind blow the pollution from the factory?

Tick (✓) **one** box.

Wind direction	**Tick (✓)**
From the factory towards the north	
From the factory towards the east	
From the factory towards the south	
From the factory towards the west	

(1)

(ii) Which row in the table shows a correct distribution of lichens?

Tick (✓) **one** row.

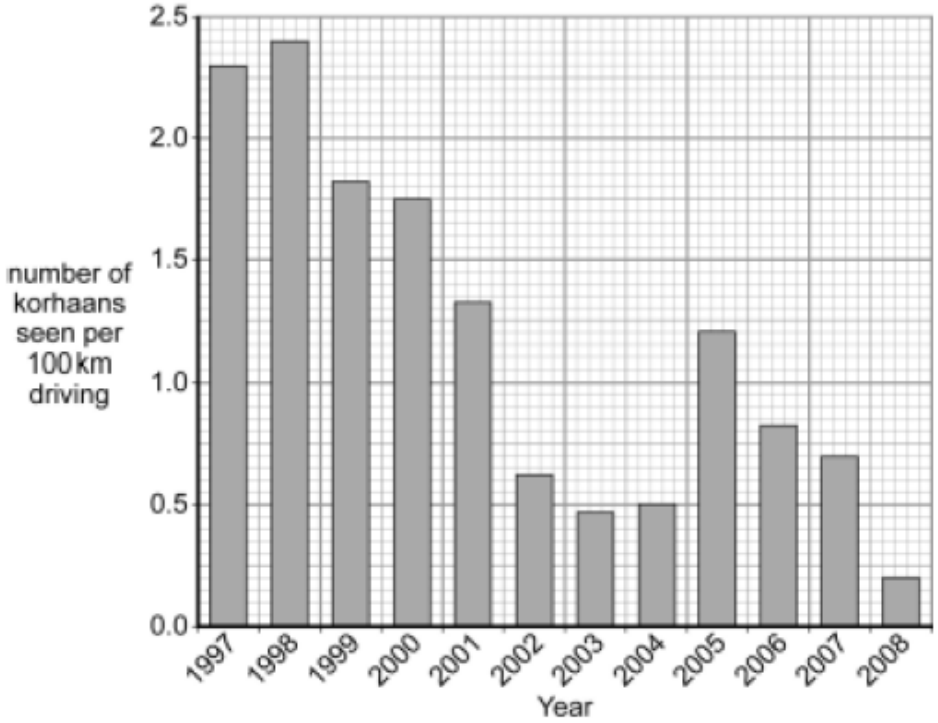
Lichen in area J	**Lichen in area K**	**Lichen in area L**	**Lichen in area M**	**Tick (✓)**
Xanthoria	Diploicia	Parmelia	Ramalina	
Degelia	Bryoria	Lecanora	Xanthoria	
Xanthoria	Lecanora	Bryoria	Parmelia	

(1)
(Total 3 marks)

Q24. The photograph shows a bird called the korhaan. Korhaans live in South Africa.

Thinkstock.com

- Scientists have studied changes in the numbers of korhaans since 1997.
- The scientists asked volunteer drivers to record the number of korhaans they see for every 100 km they drive on particular roads.
- The bar chart shows changes in the numbers of korhaans seen by the volunteers between the start of 1997 and the end of 2008.



Data from *Birds and Environmental Change: building an early warning system in South Africa* © South African National Biodiversity Institute

(a) This method of counting korhaans could have led to an inaccurate estimate of the number of korhaans.

Explain how.

.....

.....

.....

.....

(2)

(b) Which statement best describes the change in the number of korhaans between 1997 and 2008?

Tick (✓) **one** box.

Statement	**Tick (✓)**
There was a steady fall in the number of korhaans.	
The number of korhaans went up and down, but there was an overall fall in numbers.	
The number of korhaans went up and down, and there was no overall trend.	

(1)

(c) Korhaans live only amongst tall vegetation in areas of the country where there are few people.

Which is the most likely explanation for the change in the numbers of korhaans between 1997 and 2008?

Tick (✓) **one** box.

Statement	**Tick (✓)**
Many korhaans have been killed by cars.	
Many korhaans have been killed by people for food.	
The habitat of the korhaans is disappearing.	

(1)
(Total 4 marks)

Q25. 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)

Q26. 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.

.....

.....

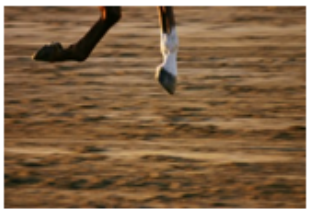
(1)

(Total 4 marks)

Q27. 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

(4)

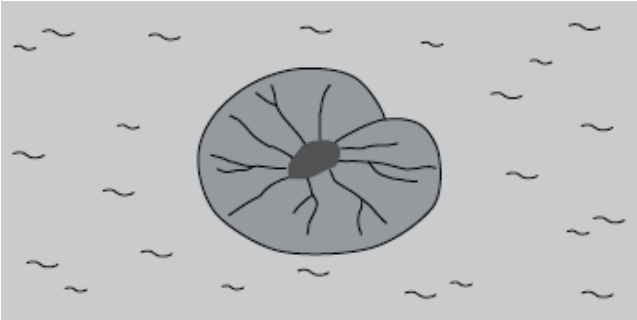
(Total 4 marks)

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

Q28. 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.

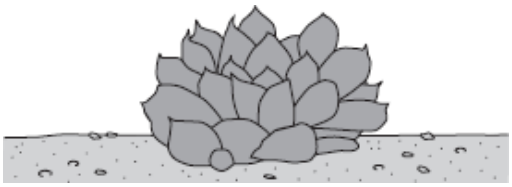
Suggest how.

.....

.....

(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)

Q29. 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.

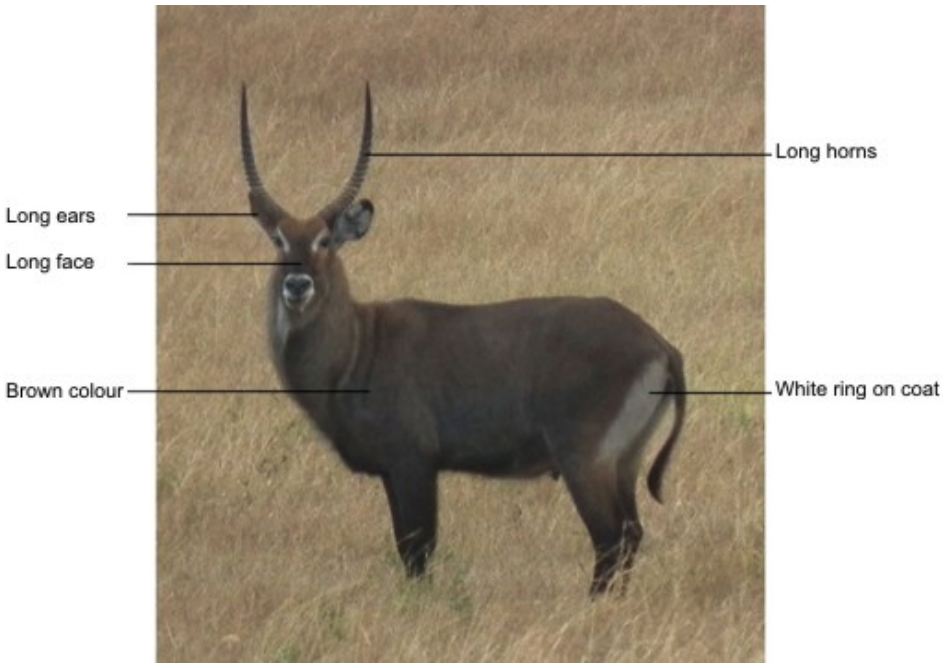
.....

.....

(2)
(Total 6 marks)

Q30. 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?

.....

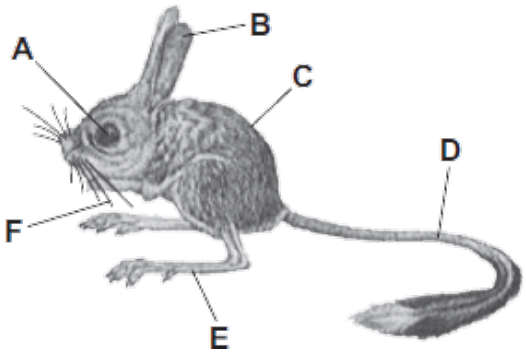
(1)

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

.....

(1)
(Total 4 marks)

Q31. 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)

Q32. 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?

.....

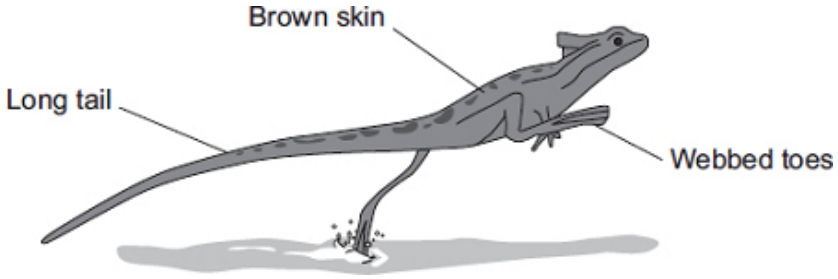
.....

.....

.....

(1)
(Total 4 marks)

Q33. 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)

Q34. There are two forms of peppered moth, dark and pale.
Birds eat the moths when the moths are resting on tree bark.

Pollution in the atmosphere may:

- kill lichens living on tree bark
- make the bark of trees go black.

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

Lichens are very sensitive to air pollution caused by

carbon dioxide.
nitrogen.
sulfur dioxide.

(1)

(b) The photographs show the two forms of peppered moth, on tree bark.

Tree bark covered with lichens Tree bark made black by pollution

(i) The dark form of the peppered moth was produced by a change in the genetic material of a pale moth.

Use **one** word from the box to complete the sentence.

characteristic	**clone**	**mutation**

A change in genetic material is called a .....

(1)

(ii) In the 19th century, pollution made the bark of many trees go black.

Explain why:

- the population of the pale form of the moth in forests decreased
- the population of the dark form of the moth in forests increased.

.....

.....

.....

.....

.....

.....

.....

.....

(3)

(c) (i) The larvae (young) of the peppered moths eat the leaves of birch trees.

The diagram shows the food chain:

birch trees → peppered moth larvae → birds

Draw a pyramid of biomass for this food chain.

Label the pyramid.

(2)

(ii) Which **two** reasons explain the shape of the pyramid you drew in part (c)(i)?

Tick (✓) **two** boxes.

Some material is lost in waste from the birds	☐
The trees are much larger than peppered moth larvae	☐
Peppered moth larvae do not eat all the leaves from the trees	☐
The trees do not use all of the Sun's energy	☐

(2)
(Total 9 marks)

Q35. Many organisms are adapted to avoid being eaten.

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

© Thomas Marent/ardea.com

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

© Alexandr Pakhnyushchyy/iStock

Hoverfly

© 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)