AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



EXAM QUESTION PACK

4.7.1 ADAPTATIONS, INTERDEPENDENCE AND COMPETITION (PACK 2)

SCORE	PERCENTAGE
/212	%

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Q1.

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

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

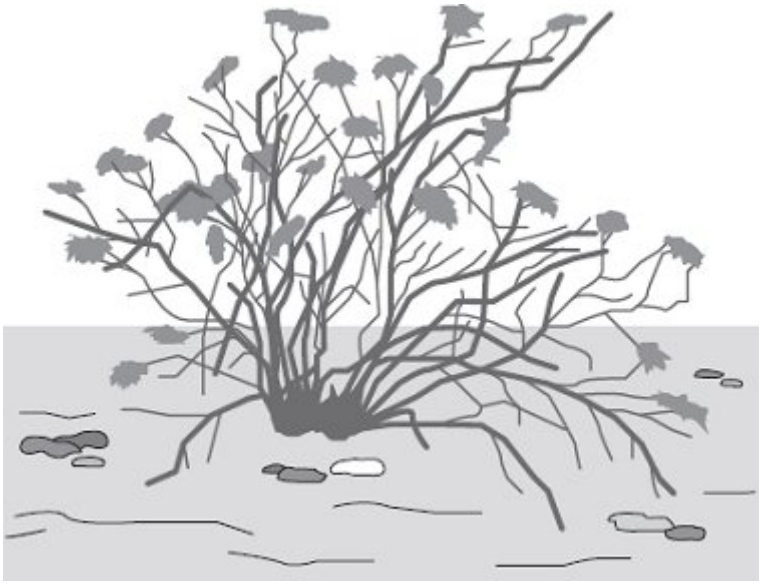
(i) Name **two** things for which plants compete.

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.

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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)

Q2.

Organisms have adaptations that enable them to survive in extreme conditions.

(a) The photograph shows an arctic fox.



By Algkalv (Own work) [CC-BY-3.0], via Wikimedia Commons

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This fox lives in the Arctic, where it is very cold.

Suggest **two** ways in which the arctic fox is adapted for life in very cold conditions.

Explain how each adaptation helps the arctic fox to survive in very cold conditions.

Adaptation 1 _____

_____

How this adaptation helps the arctic fox to survive in very cold conditions.

_____

_____

_____

Adaptation 2 _____

_____

How this adaptation helps the arctic fox to survive in very cold conditions.

_____

_____

_____

(4)

(b) The photograph shows an antelope that lives in a sandy desert.



By Sun417 at zh.wikipedia [Public domain],
from Wikimedia Commons

The antelope is prey to large cats such as cheetahs.

Suggest **one** adaptation that helps this antelope avoid being killed by predators.

Explain how this adaptation helps the antelope avoid being killed by predators.

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Adaptation _____

_____

How this adaptation helps the antelope avoid being killed by predators.

_____

_____

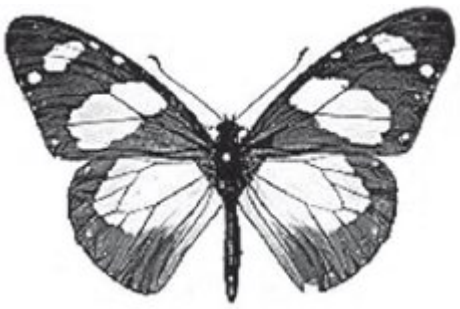
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(2)

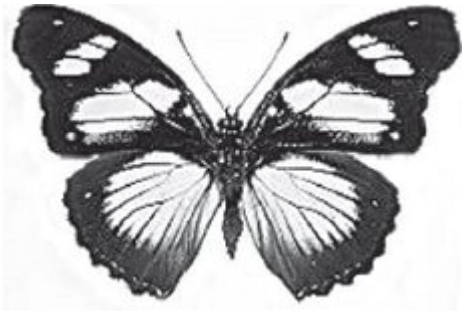
(Total 6 marks)

Q3.

The drawings show two different species of butterfly.



Amauris



Hypolimnas

- Both species can be eaten by most birds.
- *Amauris* has an unpleasant taste which birds do **not** like, so birds have learned **not** to prey on it.
- *Hypolimnas* does **not** have an unpleasant taste but most birds do **not** prey on it.

(a) Suggest why most birds do **not** prey on *Hypolimnas*.

_____

_____

_____

_____

(2)

(b) Suggest an explanation, in terms of natural selection, for the markings on the wings of *Hypolimnas*.

_____

_____

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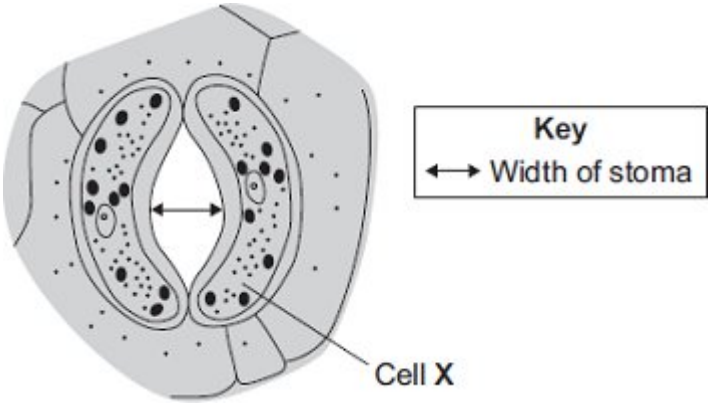
_____

(3)

(Total 5 marks)

Q4.

Plant leaves have many stomata.
The diagram shows a stoma.



(a) Name cell **X** _____

(1)

(b) The table shows the mean widths of the stomata at different times of the day for two different species of plant.
Species **A** grows in hot, dry deserts.
Species **B** grows in the UK.

	Time of day in hours	Mean width of stomata as a percentage of their maximum width	
		Species A	Species B
Dark	0	95	5
	2	86	5
	4	52	6
Light	6	6	40
	8	4	92
	10	2	98
	12	1	100
	14	0	100
	16	1	96

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	18	5	54
Dark	20	86	6
	22	93	5
	24	95	5

The data in the table show that species **A** is better adapted than species **B** to living in hot, dry deserts.

Explain how.

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 5 marks)

Q5.

Human activities affect the environment.

(a) Deforestation results in an increase in carbon dioxide levels in the atmosphere.

Give **two** reasons why.

_____

_____

_____

_____

(2)

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

A dairy farmer washes out his cow shed each day. The waste water contains urine and faeces. The waste water overflows into a stream by mistake.

The waste water will have an effect on the plants and invertebrates living in the stream.

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Explain why.

(6)
(Total 8 marks)

Q6.

Penguins live mainly in the Antarctic. Penguins eat mainly fish.
Photograph 1 shows a penguin swimming underwater.

Photograph 1

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© raywoo/iStock

(a) Use information from **Photograph 1** to suggest **three** ways the penguin is adapted for catching fish.

1. _____

_____

2. _____

_____

3. _____

_____

(3)

(b) The Antarctic winter is very cold. In the winter some species of penguin huddle together as shown in **Photograph 2**.

Photograph 2



© Fuse

Suggest how the behaviour shown in **Photograph 2** helps the penguins to survive the Antarctic winter.

_____

_____

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_____

_____

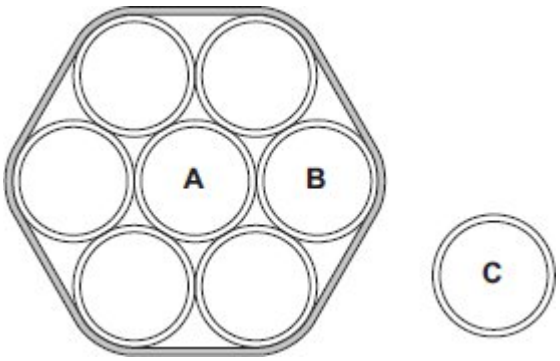
_____

_____

(3)

(c) A student did an investigation to model the behaviour of the penguins shown in **Photograph 2**.

The diagram shows the apparatus the student used.



The student:

- held seven similar test tubes together with elastic bands as shown in the diagram
- stood a similar eighth tube in a test tube rack
- filled each of the eight tubes with hot water to the same level
- measured the temperature of the water in tubes **A**, **B** and **C** every 2 minutes for 20 minutes.

The table shows the student's results.

Time in Minutes	**Temperature in °C**		
	Tube A	**Tube B**	**Tube C**
0	65	65	65
2	65	65	64
4	65	64	63
6	64	64	62
8	64	63	61
10	64	63	60
12	63	62	59

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14	63	62	58
16	63	61	57
18	62	61	56
20	62	60	55

(i) Give **two** variables that were controlled in the investigation.

1. _____

2. _____

(2)

(ii) Describe the patterns the data shows.

_____

_____

_____

_____

(2)

(iii) How far does the data from the model support the suggestion you made in part **(b)**?

_____

_____

_____

_____

(2)

(d) Describe how blood vessels help control human body temperature.

_____

_____

_____

_____

_____

_____

_____

_____

(4)

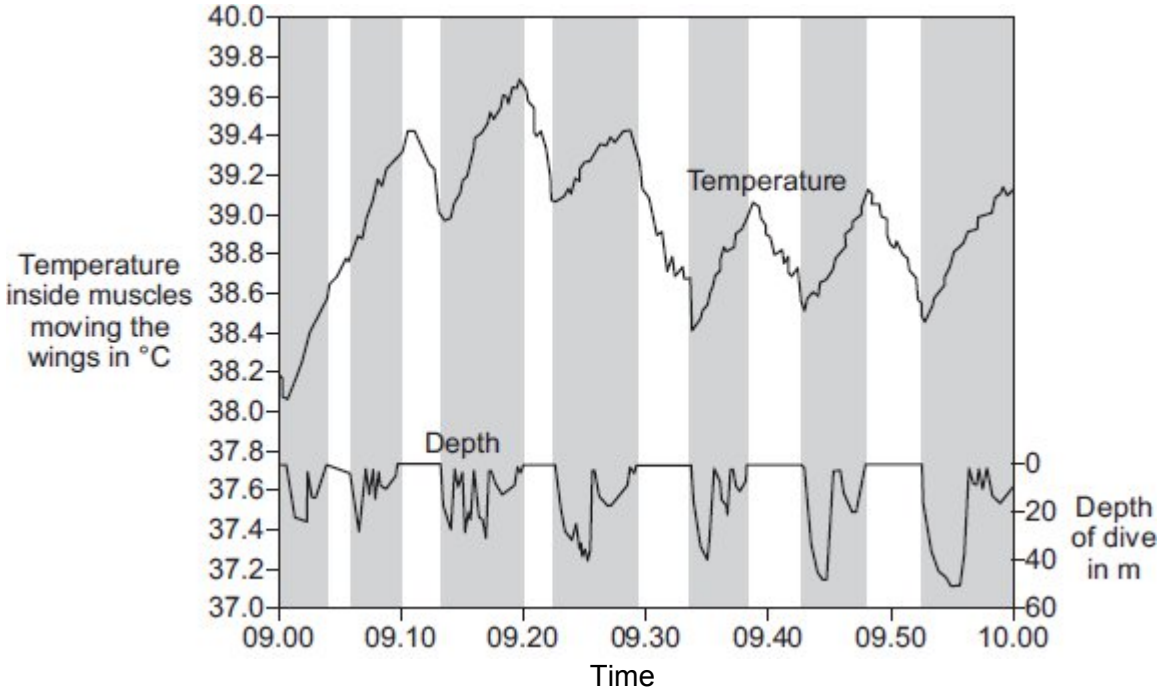
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(e) Penguins control their body temperature in similar ways to humans.
Scientists investigated changes in body temperature of penguins when the penguins were diving to catch fish.

(i) **Graph 1** shows the relationship between the temperature of the muscles moving a penguin's wings and diving.

The shaded areas show when the penguin was diving.

Graph 1



© Reprinted from Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology, Volume 135, P.J. Ponganis,R.P. Van Dam,D.H. Levenson,T. Knower,K.V. Ponganis,G. Marshall, Regional heterothermy and conservation of core temperature in emperor penguins diving under sea ice, pp 477-487, copyright 2003, with permission from Elsevier

Suggest an explanation for the changes in temperature inside the muscles moving the penguin's wings.

_____

_____

_____

_____

_____

_____

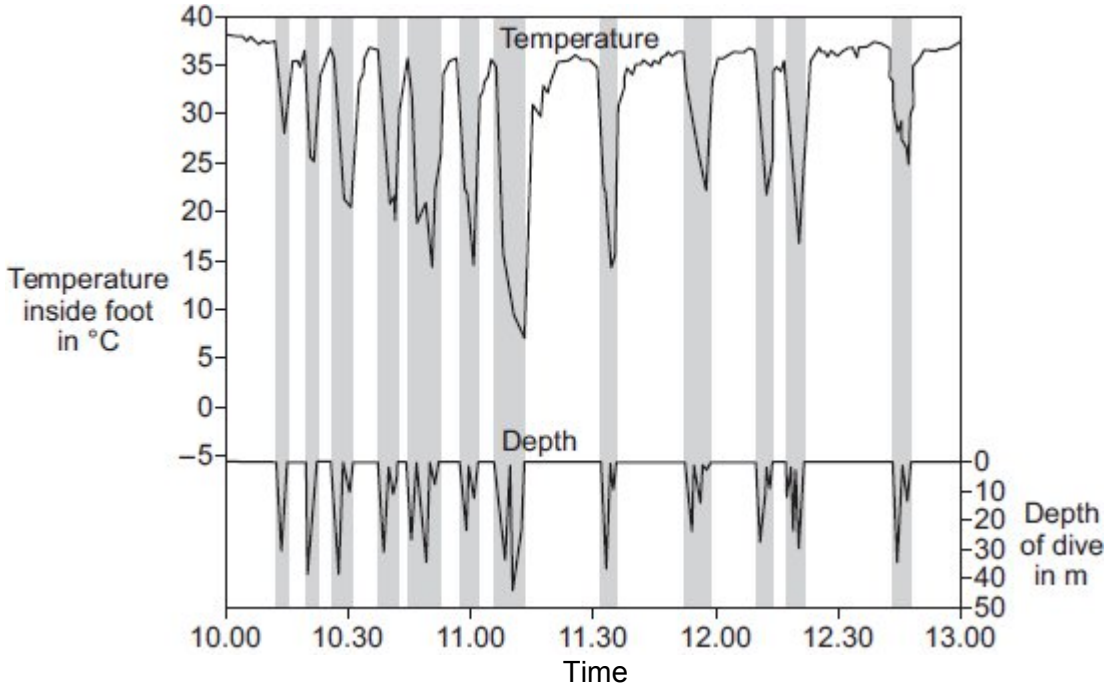
(3)

(ii) **Graph 2** shows the relationship between the temperature inside a penguin's foot and diving.

The shaded areas show when the penguin was diving.

Graph 2

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© Reprinted from Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology, Volume 135, P.J. Ponganis,R.P. Van Dam,D.H. Levenson,T. Knower,K.V. Ponganis,G. Marshall, Regional heterothermy and conservation of core temperature in emperor penguins diving under sea ice, pp 477-487, copyright 2003, with permission from Elsevier

Suggest an explanation for the changes in temperature inside the penguin's foot as it dives.

_____

_____

_____

_____

_____

_____

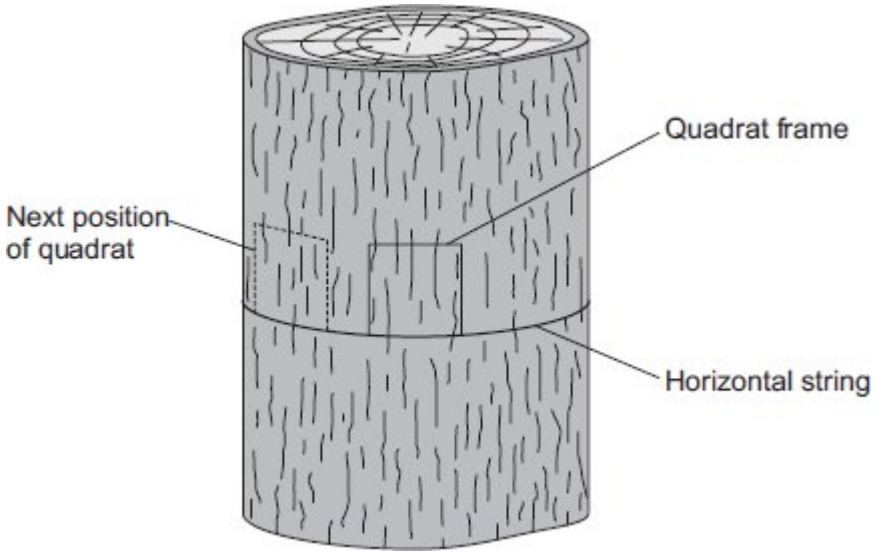
(3)

(Total 22 marks)

Q7.

Students investigated the distribution of a green alga on a tree trunk.

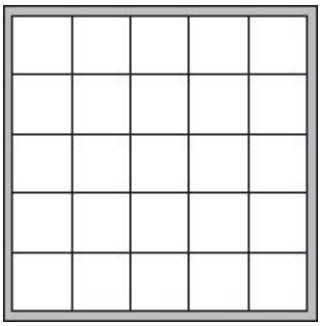
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The students:

- tied a piece of string horizontally round a tree
- put a quadrat on the string so that the quadrat faced south
- estimated the percentage of the area in the quadrat covered with the green alga
- repeated the observation with the quadrat facing south west, west, north west, north, north east, east and south east.

(a) The diagram shows the quadrat the students used.



Describe how you would estimate the percentage of the area covered with the green alga in one quadrat.

_____

_____

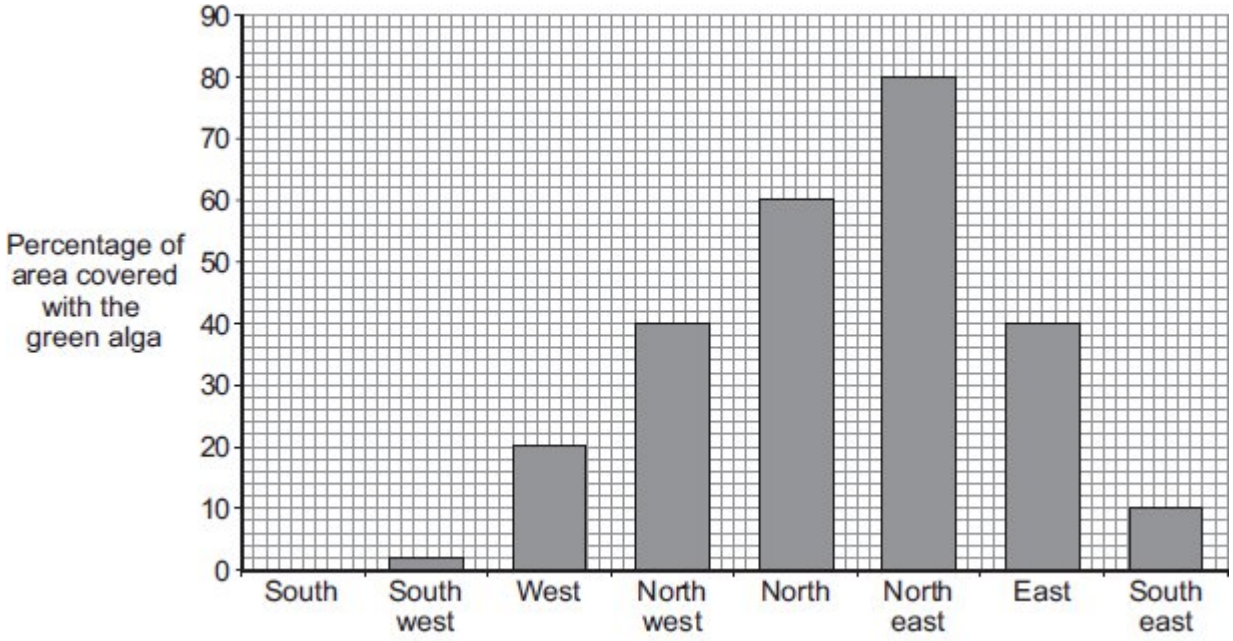
_____

_____

(2)

(b) The bar chart shows the students' results.

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(i) How does the direction that the quadrat faced affect the percentage area covered with the green alga?

_____

_____

_____

_____

(2)

(ii) What was the mode of the percentage area covered with the green alga?

Mode = _____ %

Give the reason for your answer.

_____

_____

(2)

(iii) Give **three** environmental factors that might affect the distribution of the green alga on the tree.

1. _____

2. _____

3. _____

(3)

(iv) Suggest how **one** of the factors you gave in part **(b) (iii)** might have caused the distribution of the green alga shown on the bar chart.

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Factor _____

_____

_____

_____

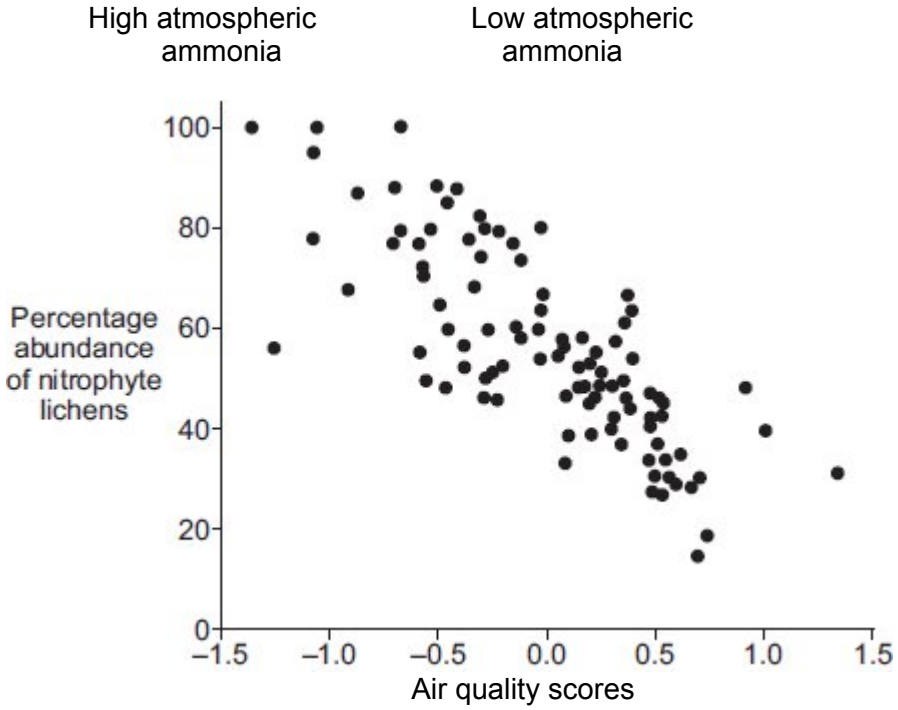
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_____

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(3)

(c) Nitrophyte lichens grow on the bark of trees. These lichens are indicators of air pollution by ammonia. Ammonia concentrations in the atmosphere are often high in agricultural areas.
The graph shows the relationship between air quality and the distribution of nitrophyte lichens.



© U.S. Department of Agriculture

(i) Describe the relationship between atmospheric ammonia and the abundance of nitrophyte lichens.

_____

_____

_____

_____

(2)

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(ii) How useful would a particular value for the abundance of nitrophyte lichens be as an indicator of ammonia pollution of the atmosphere?
Explain your answer.

_____

_____

_____

_____

(2)

(Total 16 marks)

Q8.

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.

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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

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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)

Q9.

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

© Kim Taylor/Warren Photographic

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

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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.

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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 ☐

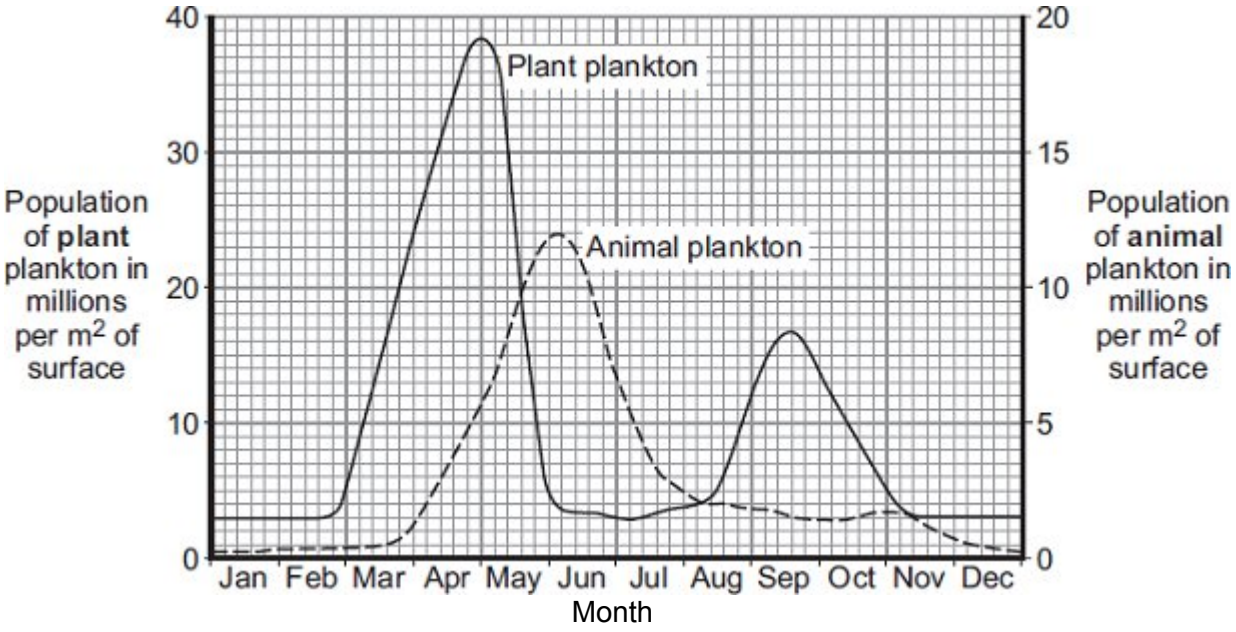
(2)
(Total 9 marks)

Q10.

Plankton live in the sea.
Animal plankton eat plant plankton.

Graph 1 shows how the populations of the plankton change through the year in the seas around the UK.

Graph 1



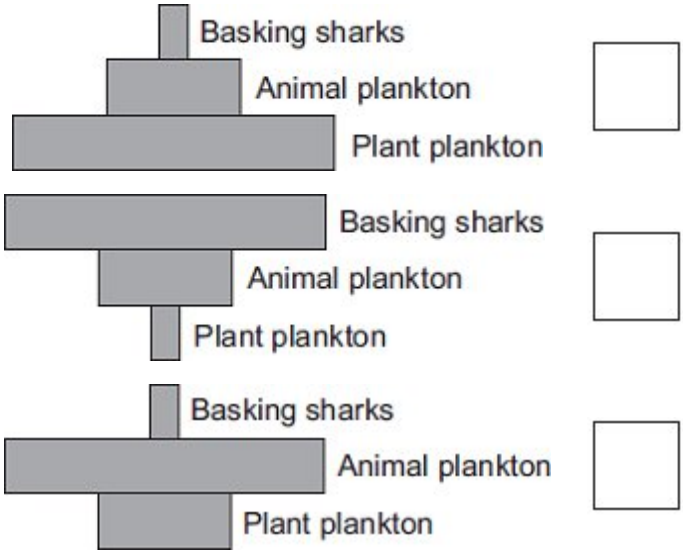
(a) Basking sharks eat animal plankton. Basking sharks grow up to 8 metres long.

Look at the diagram and **Graph 1**.

Which is the correct shape for the pyramid of biomass to show the relationship between plant plankton, animal plankton and basking sharks, in June?

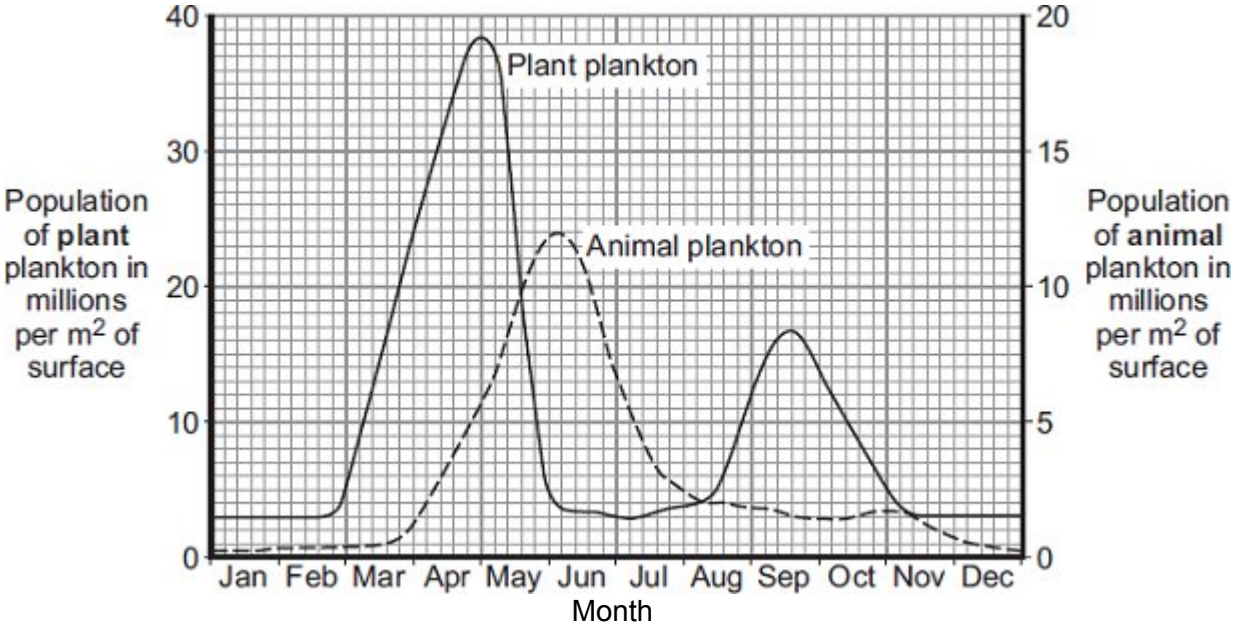
Tick (✓) **one** box.

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(1)

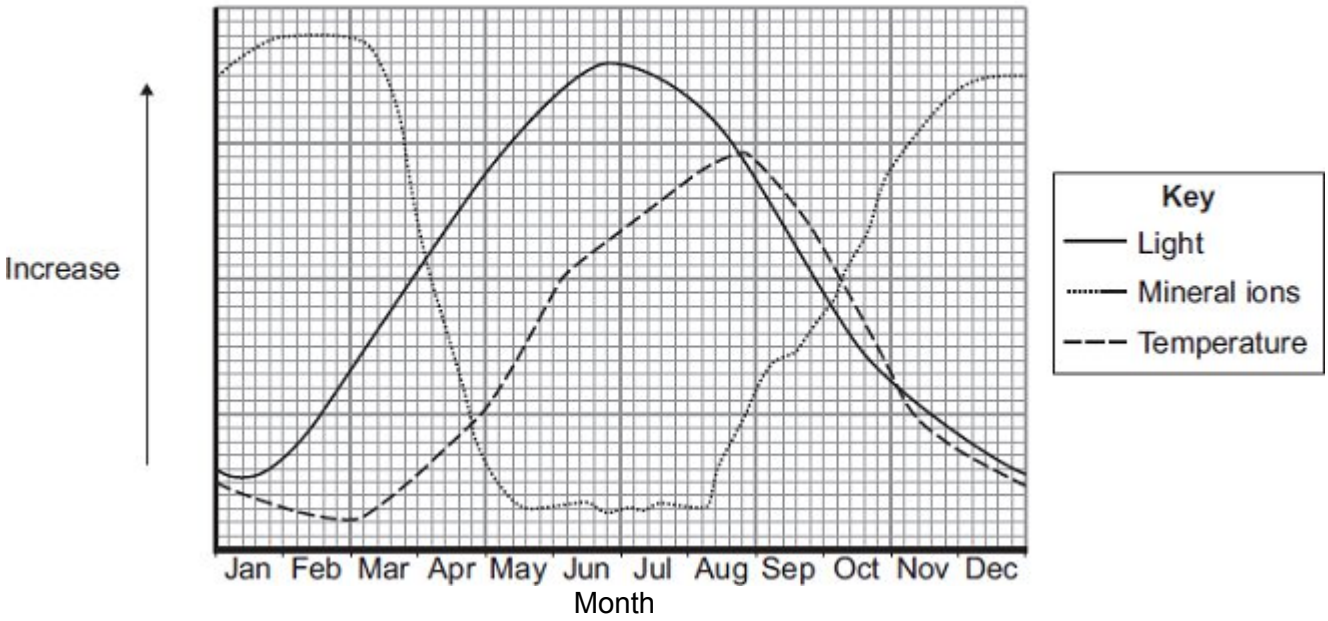
Graph 1 is repeated here to help you answer the following questions.



Graph 2 shows changes in some of the conditions in the upper layers of the sea around the UK.

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Graph 2



(b) The population of plant plankton increases between February and April.

Suggest **one** reason for the increase.

Explain your answer.

_____

_____

_____

_____

(2)

(c) The population of animal plankton changes between April and July.

Suggest explanations for the changes.

_____

_____

_____

_____

_____

(2)

(d) The concentration of mineral ions changes between February and December.

Suggest explanations for the changes.

_____

_____

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_____

_____

_____

_____

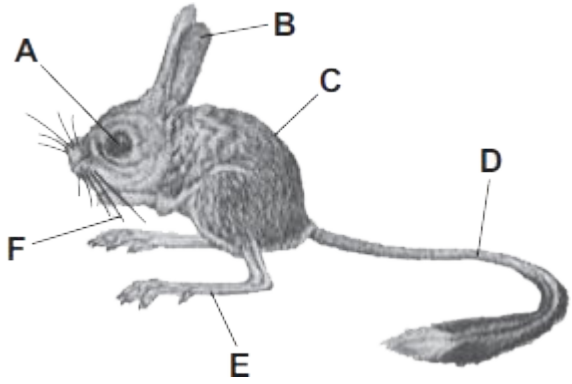
_____

(3)

(Total 8 marks)

Q11.

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)

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

(1)

(Total 5 marks)

Q12.

Squirrels live in woodland.

Table 1 shows:

- the total area of England, Scotland and Wales
- the area of different types of woodland in these countries.

Table 1

Country	Total area of country in thousands of km^2	Area of woodland in thousands of km^2		
		Coniferous woodland	Broadleaf woodland	Total
England	130	3.6	7.8	11.4
Scotland	79	10.4	3.0	13.4
Wales	21	1.9	0.9	2.8

(a) Look at the data for the three countries. Estimate which country has the greatest proportion of its area suitable as a habitat for squirrels.

Support your answer with relevant figures.

_____

_____

_____

_____

_____

_____

(2)

(b) The maps show the distribution of grey squirrels and red squirrels in England, Scotland and Wales.

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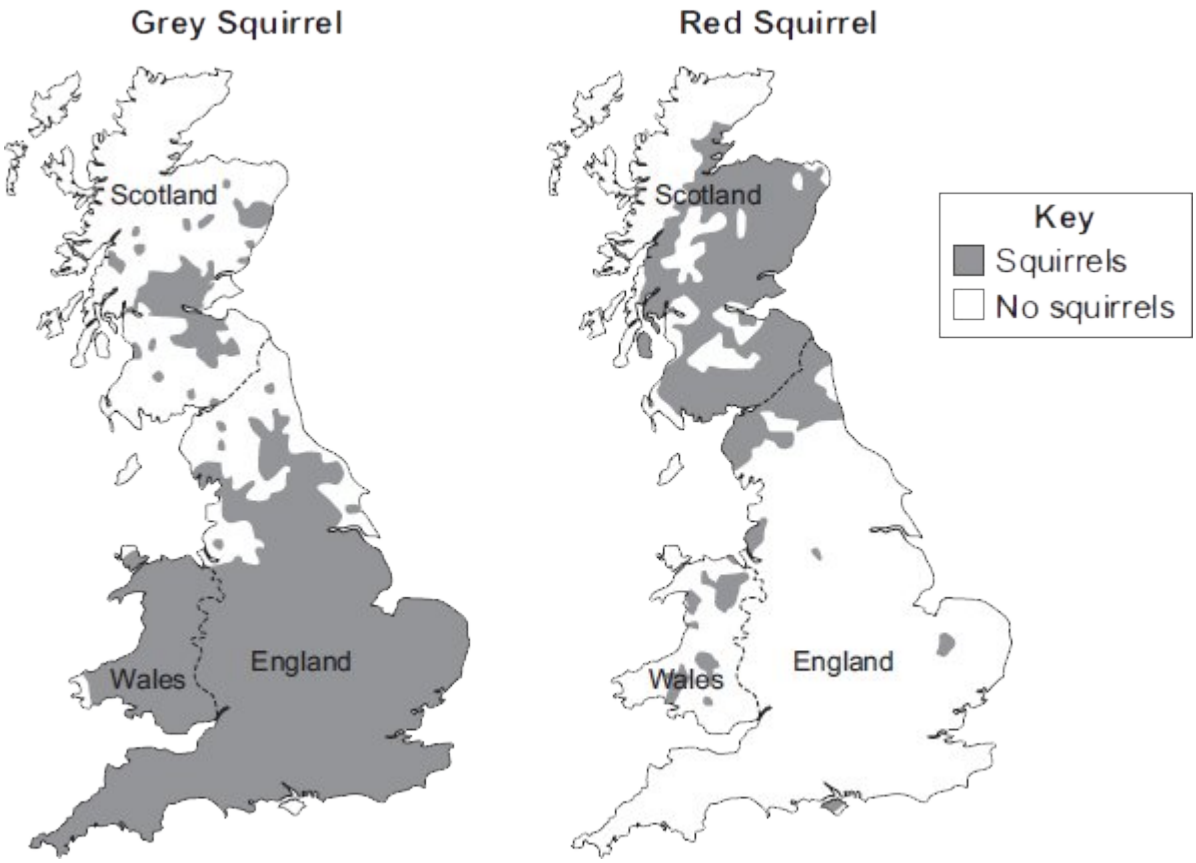


Image under Crown Copyright and courtesy of Pepper & Patterson, 2001.
Contains public sector information licensed under the Open Government Licence v1.0

Scientists suggested that the distribution of grey squirrels and red squirrels is linked to the type of trees in woodlands.

(i) The information for England and Scotland supports this suggestion.

How?

_____

_____

(1)

(ii) Give **one** piece of evidence that contradicts this suggestion.

_____

_____

(1)

(c) Red squirrels are native to the UK.
Grey squirrels were introduced to the UK from the USA over 100 years ago.

Table 2 gives information about the two types of squirrel.

Table 2

	Grey squirrel	**Red squirrel**
Population in UK	2.5 million	140 000

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Main food types	Seeds, nuts, tree bark, birds' eggs, young birds	Cones from coniferous trees, nuts, tree bark, berries
Health	Can become immune to parapox virus	Cannot become immune to parapox virus
Reproduction	Up to 9 young, twice a year	Up to 6 young, twice a year
Survival rate of young in mixed populations	41 %	14 %
Length of life	2 – 4 years	Up to 7 years

In most parts of the UK the population of grey squirrels is increasing, but the population of red squirrels is decreasing.

Suggest why.

Use information from **Table 2**.

_____

_____

_____

_____

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_____

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(3)

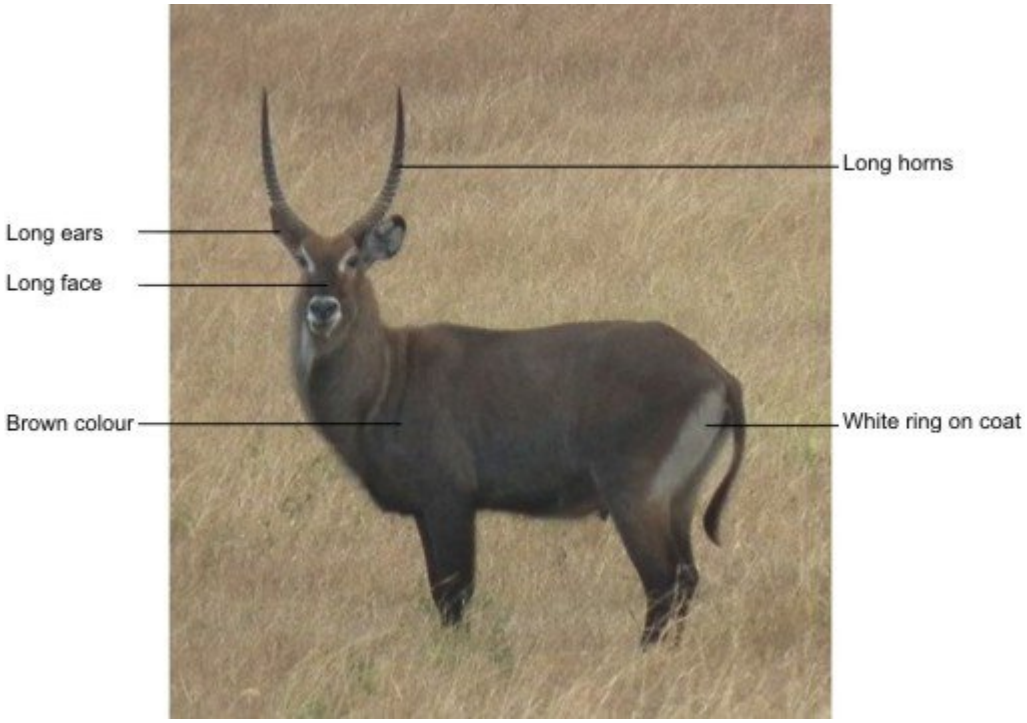
(Total 7 marks)

Q13.

The photograph shows some features of a waterbuck.

Waterbuck live in areas of tall, brown grass.

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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)

Q14.

An animal called *Tiktaalik* became extinct about 360 million years ago.

The photograph shows the fossilised skeleton of *Tiktaalik* and a model of what scientists think *Tiktaalik* looked like.

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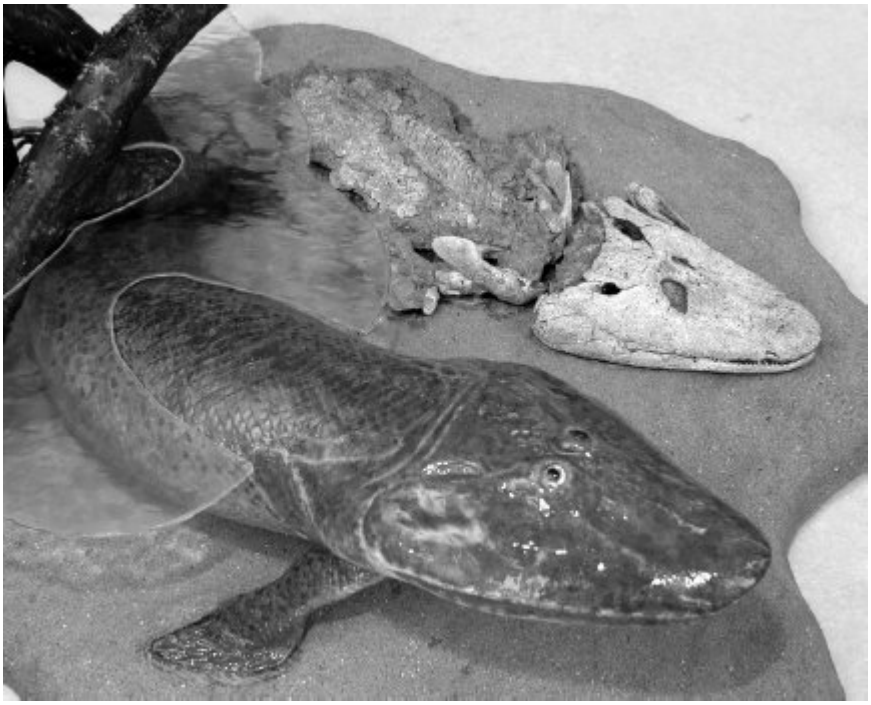


Image © University of Chicago, Shubin Lab. Model by Tyler Keillor

(a) Scientists found only the fossilised skeleton of *Tiktaalik*.

Explain why.

_____

_____

_____

_____

(2)

(b) Scientists think that *Tiktaalik* lived mostly in water, but that it was one of the first animals to be able to move onto land.

Use evidence from the photograph to suggest why.

_____

_____

_____

_____

(2)

(Total 4 marks)

Q15.

Fruits contain seeds. Most plants produce fruits that are adapted for dispersing seeds. Seeds are dispersed so that young plants do not grow near their parents.

(a) Explain the advantage to plants of dispersing their seeds.

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_____

_____

_____

_____

(2)

(b) The photograph shows cocklebur fruits.



Photograph by Robert H. Mohlenbrock. Image in the public domain as a work of the U.S. federal government. Courtesy of USDA NRCS Wetland Science Institute.

The photograph is magnified.

Suggest how cocklebur fruits are adapted for dispersing their seeds.

_____

_____

_____

_____

(2)

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(Total 4 marks)

Q16.

In a woodland, bluebells grow well every year.

Bluebells growing well in woodland



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

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

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

The words in the box may help you.

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

_____

_____

_____

_____

_____

_____

(Total 3 marks)

Q17.

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

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Plants and animals have become adapted in many different ways to reduce the risk of being eaten by predators.

Describe these adaptations.

Give examples of animals and plants adapted in the ways you describe.

(Total 6 marks)

Q18.

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

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

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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

_____

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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)

Q19.

The photograph shows a lionfish. Lionfish are normally found in the Pacific Ocean.

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By Albert Kok at nl.wikipedia [Public domain], from Wikimedia Commons

In 1992 six lionfish escaped from an aquarium into the Atlantic Ocean.

Now there are thousands of lionfish in the Atlantic Ocean. Numbers of the native Atlantic fish have gone down because the lionfish have eaten many native Atlantic fish.

Suggest explanations for the large increase in the number of lionfish in the Atlantic Ocean.

_____

_____

_____

_____

_____

_____

_____

_____

(Total 3 marks)

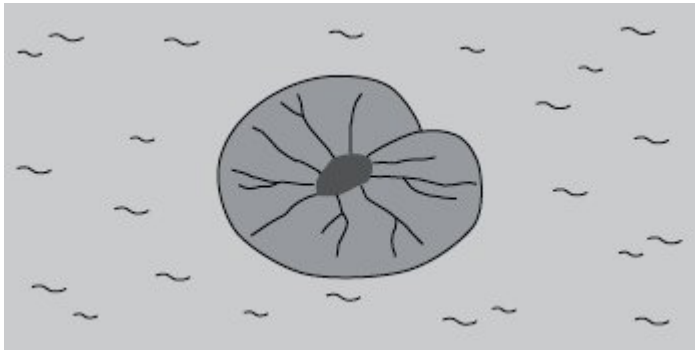
Q20.

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.

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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.

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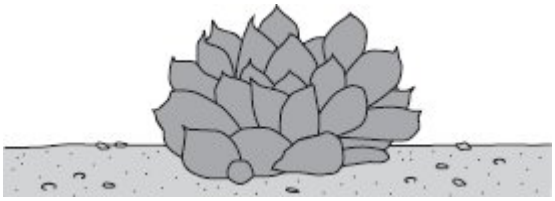
Suggest how.

_____

_____

(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)

Q21.

In the winter wild birds cannot find food easily.
A student carried out an investigation to find the best kind of food to put out for wild birds in winter.

- She nailed six black dishes to a piece of wood.
- She put 100 g of a different type of seed into each dish.
- She placed the piece of wood in her garden.
- She observed the birds that visited each of the dishes before school, after school and at weekends.
- At the end of the investigation, she weighed the amount of each type of seed remaining.
- She also calculated the percentage of each type of seed that was eaten by the birds.

(a) Name **two** control variables in this investigation.

1. _____

2. _____

(2)

(b) **Table 1** shows the number of bird visits to each dish of seeds that she recorded.

Table 1

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Bird species	Number of visits to each dish of seeds					
	Corn	Niger	Safflower	Sunflower	Peanut	Millet
Morning Dove	12	10	6	13	2	10
Red-bellied Woodpecker	1	0	0	1	4	0
Dark-eyed Junco	3	6	1	4	0	3
Northern Cardinal	0	0	1	1	2	0
American Goldfinch	0	31	5	18	0	0
House Finch	1	5	23	19	1	3
House Sparrow	16	1	0	4	0	11
Total visits	33	53	36	60	9	27

Which type of seed had visits from the greatest number of **different** bird species?

_____

(1)

(c) **Table 2** shows:
- the percentage of each type of seed eaten
- the percentage of fat in each type of seed.

Table 2

Type of seed	Percentage eaten	Percentage of fat
Corn	68	2
Niger	77	40
Safflower	86	3
Sunflower	91	35
Peanut	4	48
Millet	99	2

(i) The girl concluded that the most popular seeds for the birds were the seeds with the highest percentage of fat.

Was her conclusion justified by the data in **Table 2**?

Draw a ring round your answer. **Yes / No**
Give a reason for your answer.

_____

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_____

(1)

(ii) Most winter bird food for sale in shops contains niger and sunflower seeds. Use the information in **Table 1** and **Table 2** to suggest **two** reasons why.

1. _____

_____

2. _____

_____

(2)

(Total 6 marks)

Q22.

Desert plants are adapted for survival in a dry climate.

(a) Joshua trees live in deserts.



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

Joshua trees have two different types of root:

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- a system of shallow roots spread out over a large area
- roots about 1 m in diameter, shaped like bulbs, deep in the soil.

Explain the advantage to the Joshua tree of having:

(i) shallow roots spread out over a large area

_____

_____

_____

_____

(2)

(ii) large, bulb-like roots deep in the soil.

_____

_____

(1)

(b) Creosote bushes also live in deserts.



By Sue in az (Own work) [Public domain], via Wikimedia Commons

The leaves of creosote bushes:
- are covered with a layer of wax
- fold together during the day.

Explain how the leaves of the Creosote bush help it to survive in deserts.

_____

_____

_____

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_____

_____

_____

(3)

(Total 6 marks)

Q23.

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

The photographs show the feet of four different animals.

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

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

(Total 4 marks)

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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

Q24.

Animals in a habitat compete with each other.

(a) Give **two** factors for which animals may compete.

1. _____

2. _____

(2)

(b) The photographs show a mule deer and a white-tailed deer.

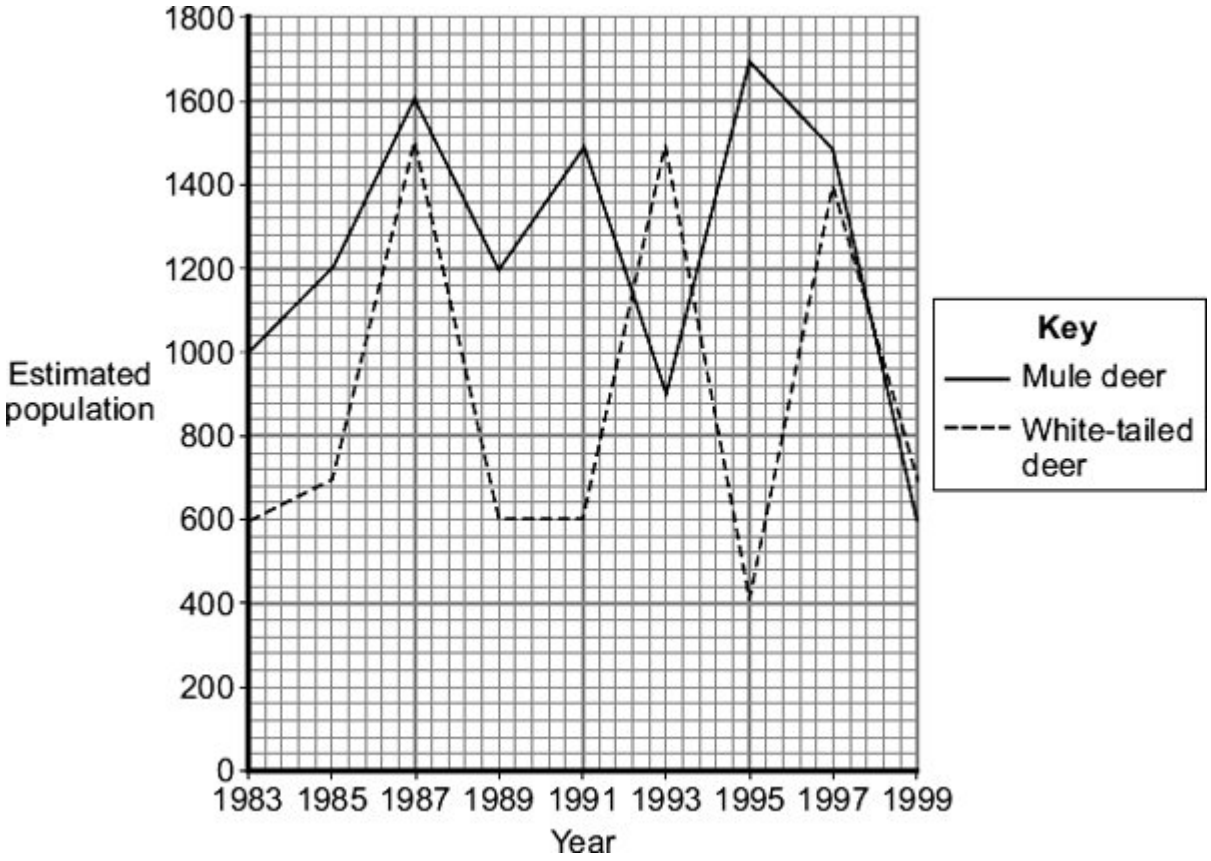


Mule deer **White-tailed deer**

Mule deer by Dcrjsr (Own work) [CC-BY-3.0], via Wikimedia Commons. White-tailed deer by Clay Heaton (Own work) [CC-BY-SA-3.0], via Wikimedia Commons

Mule deer and white-tailed deer live together in the same national park in the USA.

The graph shows changes in the populations of the two deer species between 1983 and 1999.



(i) Describe the changes in the population of white-tailed deer between 1991 and 1995.

_____

_____

_____

_____

(2)

(ii) Use information from the graph to suggest an explanation for changes in the population of white-tailed deer between 1991 and 1995.

_____

_____

_____

_____

(2)

(Total 6 marks)

Q25.

The photograph shows a snowy owl.

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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)

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Q26.

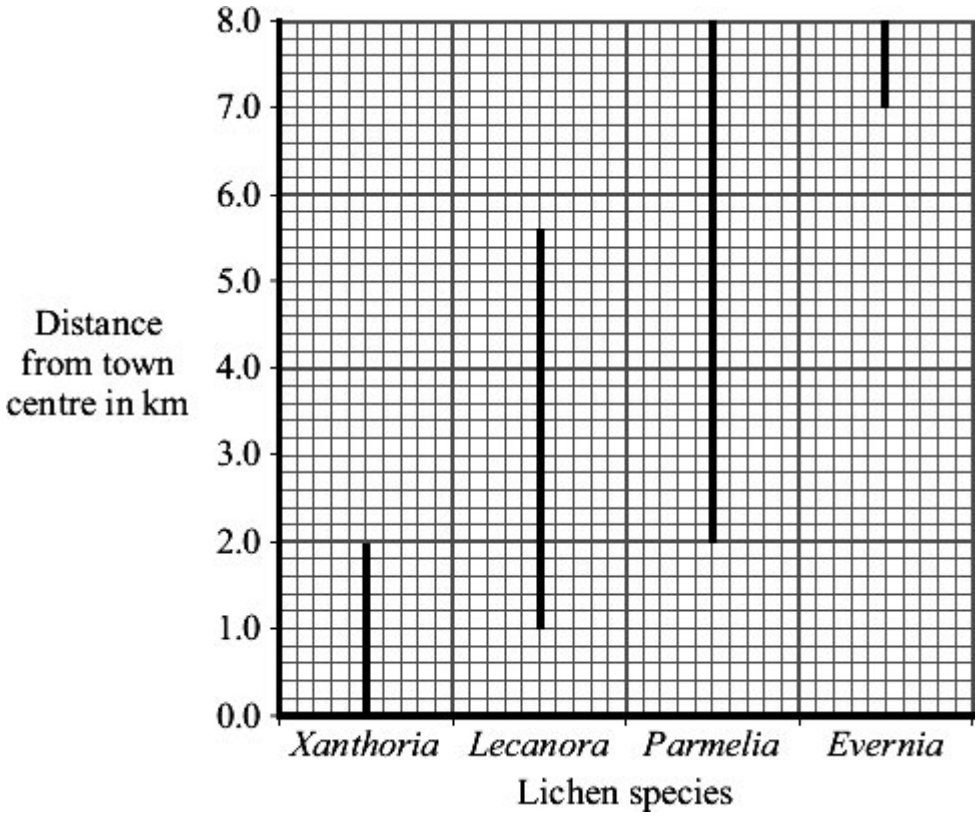
Lichens are sensitive to the amount of sulfur dioxide in the atmosphere. They are used as indicator species for the amount of air pollution. Air pollution is generally higher in town centres than in the countryside.

Students investigated the relationship between lichen species and distance from a town centre.

- On a map, they drew a transect (line) from the centre of the town to the countryside.
- They examined sites every 200 metres along the transect (line).
- At each site, they recorded the lichen species growing on trees and walls up to a height of 2 metres.

The graph shows their results.

The lines on the graph indicate the range of each lichen species.



(a) Give **one** way in which the students could have obtained more accurate results.

_____

_____

(1)

(b) (i) Which lichen species was found over the greatest range?

_____

(1)

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(ii) Which lichen species grows only in the least polluted air?

_____

(1)

(c) One student concluded 'You can tell how much sulfur dioxide there is in the air by the amount of *Lecanora* growing'.

Give **two** reasons why this is **not** a valid conclusion.

1. _____

_____

2. _____

_____

(2)

(Total 5 marks)

Q27.

The photograph shows a musk ox.



Photograph supplied by iStockphoto/Thinkstock

The musk ox lives in the Arctic. An adult musk ox is 2.5 m long and 1.4 m high at the shoulder. Adults usually have a mass of about 400 kg.

Use this information and information from the photograph to explain **two** ways in which a musk ox is adapted for survival in the Arctic.

(a) (i) Adaptation 1 _____

(1)

(ii) How this adaptation helps the musk ox to survive in the Arctic.

_____

_____

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(1)

(b) (i) Adaptation 2 _____

(1)

(ii) How this adaptation helps the musk ox to survive in the Arctic.

_____

_____

(1)

(Total 4 marks)

Q28.

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.

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_____

_____

(1)

(c) It has very large ears.

_____

_____

(1)

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

_____

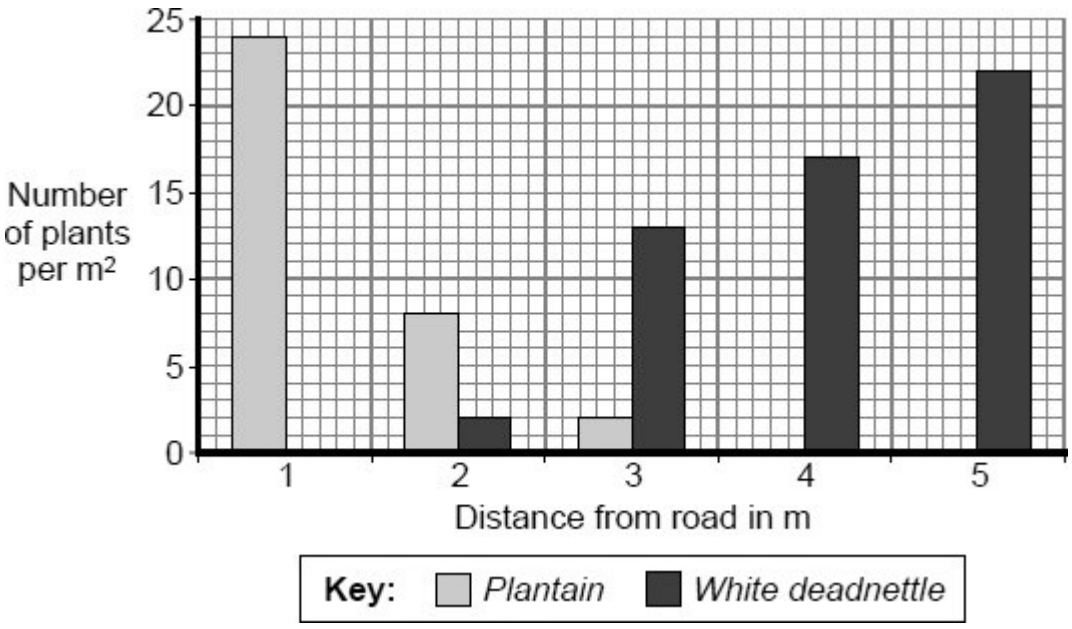
_____

(1)

(Total 4 marks)

Q29.

Students investigated the distribution of two plant species near a busy road. The bar chart shows their results.



(a) (i) Name the piece of apparatus used in sampling a 1m^2 piece of land.

_____

(1)

(ii) Describe how this piece of apparatus could be used to obtain the data shown in the bar chart.

_____

_____

_____

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_____

_____

(2)

(iii) Describe the pattern shown in the data for the *Plantain* plants.

_____

_____

_____

(1)

(b) Suggest explanations for:

(i) the distribution of the *White deadnettle* plants

_____

_____

_____

_____

_____

(2)

(ii) the distribution of the *Plantain* plants.

_____

_____

_____

_____

_____

(2)

(Total 8 marks)

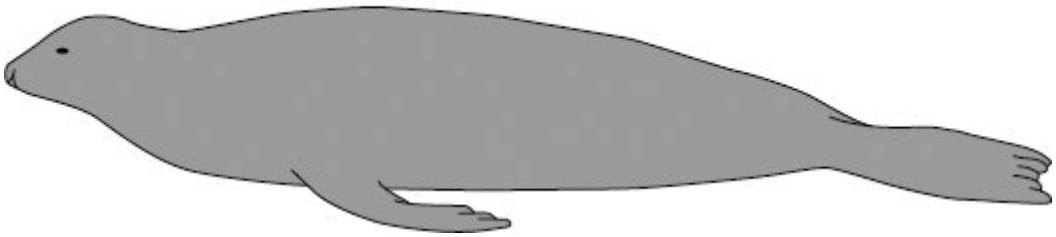
Q30.

Seals are adapted for life in the sea.
Use information from the drawings to answer the questions.

This drawing shows seal **X**.

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Seal X



(a) Give **two** ways in which seal **X** is adapted for swimming.

1. _____

_____

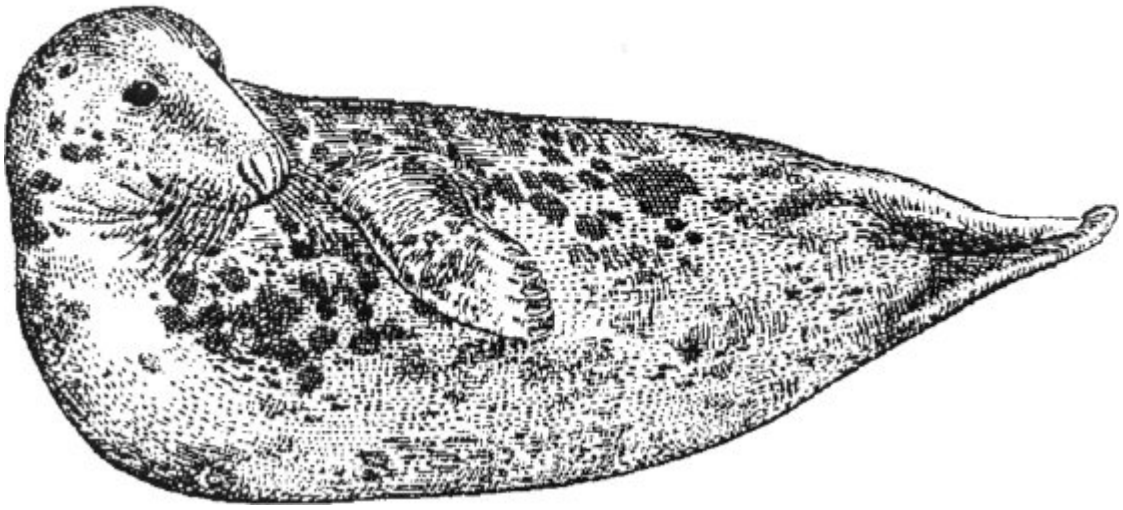
2. _____

_____

(2)

(b) This drawing shows seal **Y**, drawn to the same scale as seal **X**.

Seal Y



Seal **Y** lives in much colder seas than seal **X**.

Explain **one** way in which seal **Y** is adapted for surviving in cold seas.

_____

_____

_____

_____

(2)

(Total 4 marks)

Q31.

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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.

_____

_____

_____

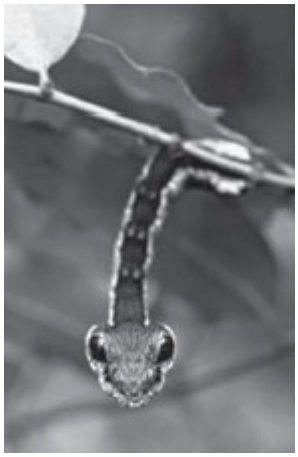
_____

_____

(2)

(b) The photograph shows a caterpillar.

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© S.J. Krasemann / Peter Arnold / Still Pictures

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.

_____

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_____

(1)

(Total 8 marks)

Q32.

(a) Explain, as fully as you can, how natural selection leads to evolution.

_____

_____

_____

_____

_____

_____

_____

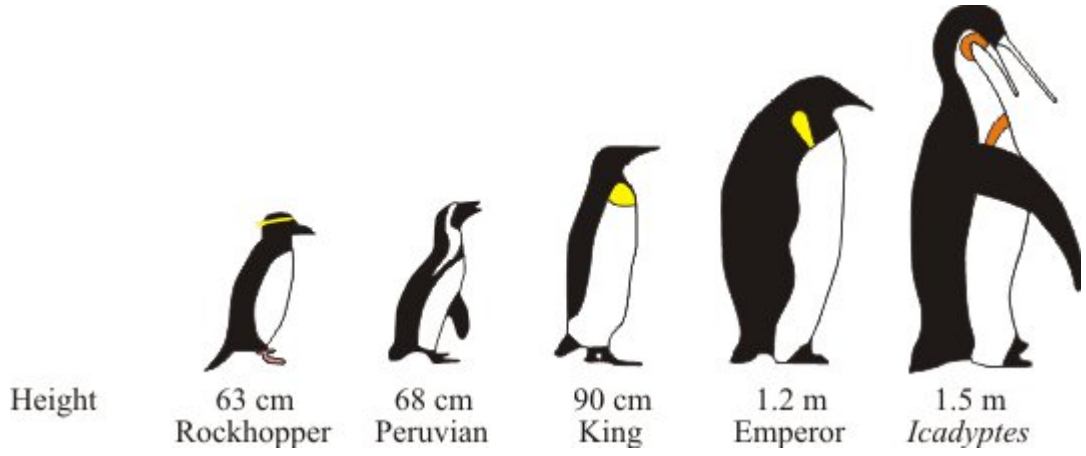
_____

(3)

(b) Most penguins live in cold climates. The modern penguin best adapted for cold conditions is the emperor penguin.

Scientists have found fossils of a 'giant' penguin which they have called *Icadyptes*.

The diagram shows how the size of modern penguins compares with *Icadyptes*.



The scientists were surprised to discover that *Icadyptes* lived in warm seas at a time when the Earth's climate was much warmer than it is now.

Explain why the scientists were surprised that *Icadyptes* lived in warm seas.

_____

_____

_____

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_____

_____

_____

_____

(2)

(Total 5 marks)

Q33.

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.

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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)

Q34.

Swallows and swifts migrate between Britain and South Africa every year.

(a) **Photograph 1** shows a swallow.

Photograph 1

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Swallows can fly very quickly.

Use information from the photograph to give **one** way in which the swallow is adapted for flying very quickly.

_____

_____

(1)

(b) **Photograph 2** shows swifts.

Photograph 2



Swallows and swifts both feed on flying insects.
They both spend the summer in Britain and then migrate to South Africa in the autumn.

Suggest **one** reason why swallows and swifts do not stay in Britain in the winter.

_____

_____

(1)

(c) The table gives data about swallows and swifts.

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	Swallows	Swifts
Arrival date in Britain	April	Early May
Leaving date from Britain	October	Early August
Food	Flying insects	Flying insects
Height at which the birds feed	Near ground level	Up to 350m above ground level
Times at which birds feed	Mainly when it is light	Almost 24 hours per day

(i) There is very little competition between swallows and swifts for food.

Use information from the table to suggest **two** reasons for this.

1. _____

_____

2. _____

_____

(2)

(ii) Swallows and swifts do compete for some factors.

Suggest **one** of these factors.

_____

_____

(1)

(Total 5 marks)

Q35.

The drawing shows a poison-dart frog.



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

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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)

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