1 Many organisms are adapted to avoid being eaten.

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

The gecko is adapted to avoid being eaten by predators.

Explain how.

_____

_____

_____

_____

(2)

(b) Ants can give a painful bite.

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

Acacia trees have thorns on their branches.

Branch of acacia tree.

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

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

Suggest why.

_____

_____

(1)

(ii) Giraffes eat the leaves of acacia trees.

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

Suggest why.

_____

_____

(1)

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

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

Wasp

© 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)

2 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.

_____

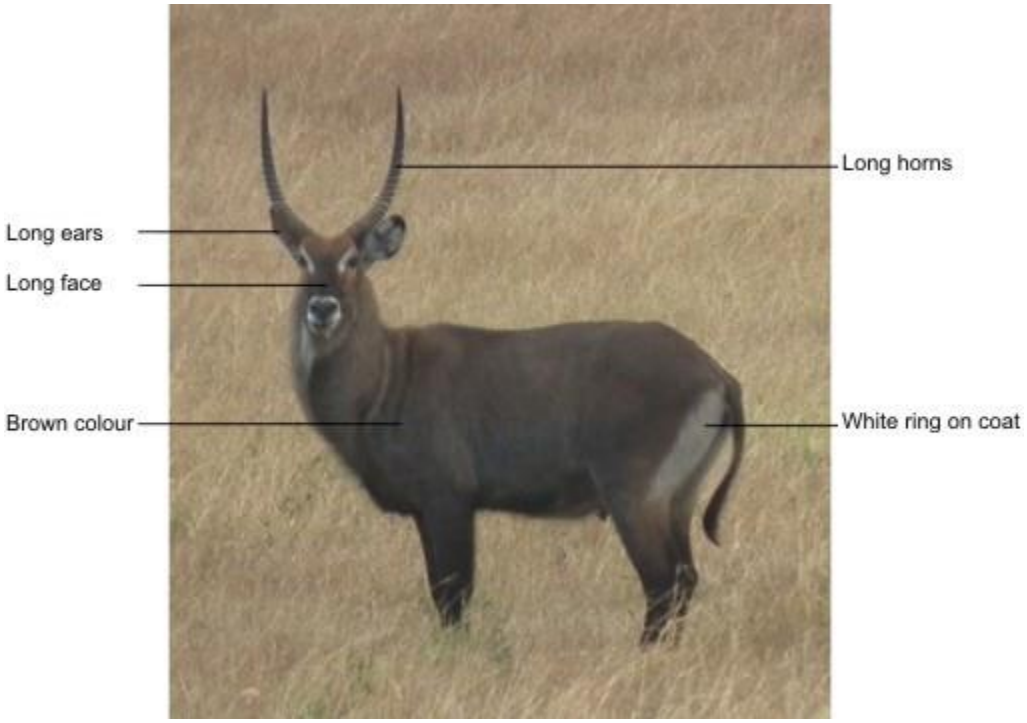
_____

(1)

(Total 4 marks)

3 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)

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

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

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

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

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

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

_____

_____

(1)

(b) Complete the sentences.

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

_____

(1)

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

theory of _____

(1)

(Total 3 marks)

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

The photographs show the feet of four different animals.

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

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

(Total 4 marks)

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

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

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

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

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

(i) The gas which causes global warming is

carbon dioxide.

oxygen.

sulfur dioxide.

(1)

(ii) The gas which causes acid rain is

methane.

oxygen.

sulfur dioxide.

(1)

(b) The photograph shows a quarry.

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

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

(i) Quarrying

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

(1)

(ii) Quarrying can be reduced by recycling

- metals.
- paper.
- plastic

(1)

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

Photograph supplied by Hemera/Thinkstock

Chemicals in the spray kill insects on the trees.

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

(i) The spray contains

fertiliser.

herbicide.

pesticide.

(1)

(ii) The chemical in the spray might also

kill other animals.

kill plants.

increase biodiversity.

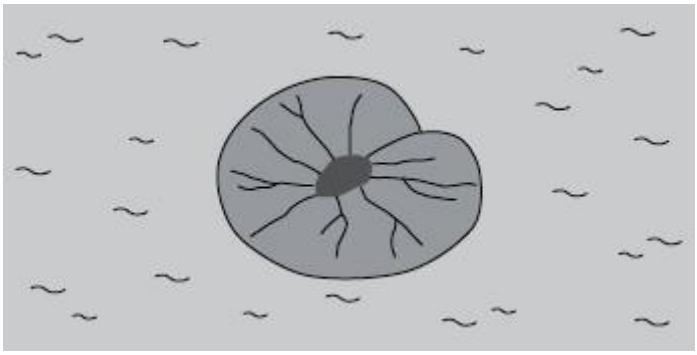
(1)

(Total 6 marks)

7 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.

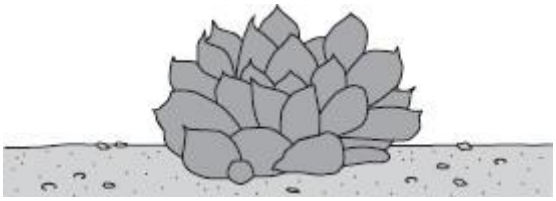
Suggest how.

_____

_____

(1)

(d) This plant lives in very dry areas.



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

Suggest how.

_____

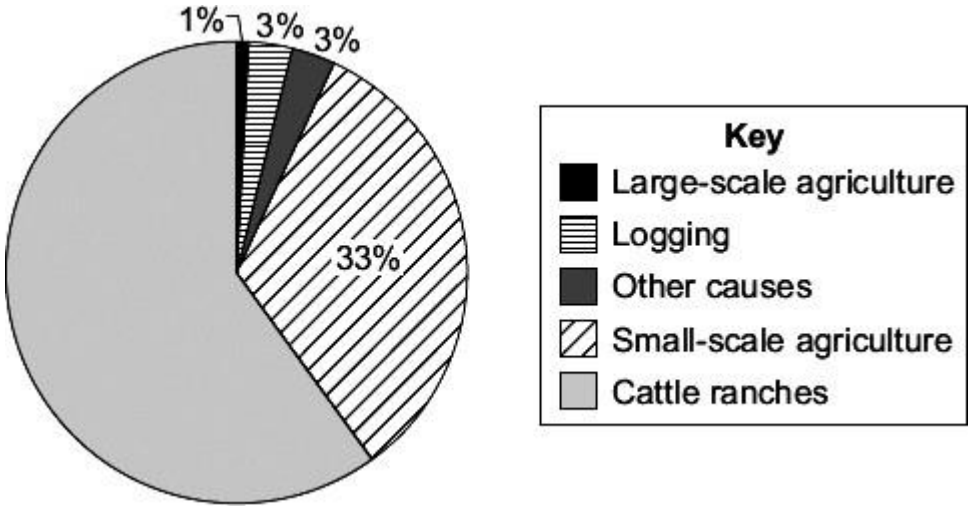
_____

(1)

(Total 4 marks)

8 Large-scale deforestation is taking place in Brazil.

The pie chart shows the causes of deforestation in Brazil.



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

Show clearly how you work out your answer.

_____

_____

Percentage = _____

(2)

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

The methane causes the Earth's temperature to increase.

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

1. _____

_____

2. _____

_____

(2)

(Total 4 marks)

9 The amount of carbon dioxide in the atmosphere is increasing.

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

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

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

Show clearly how you work out your answer.

Answer _____ million tonnes

(2)

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

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

Show clearly how you work out your answer.

Answer _____ million tonnes

(2)

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

Plants use carbon dioxide in the process of

decomposition.
photosynthesis.
respiration.

(1)

(Total 5 marks)

10 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)

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

(a) The students decided to use quadrats.

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

_____

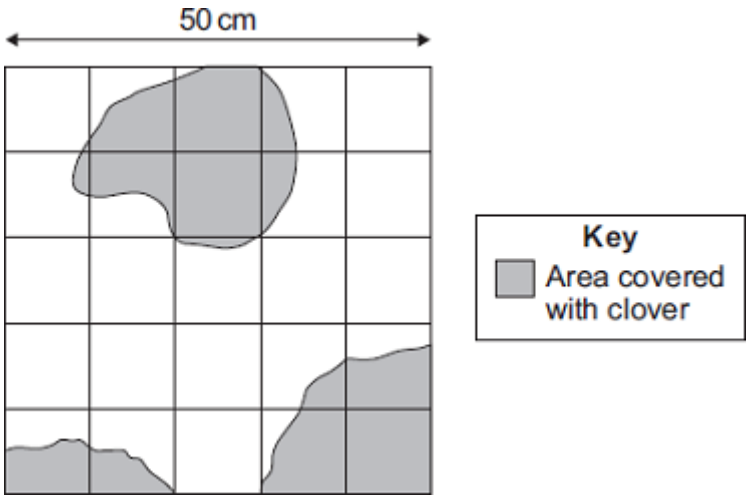
_____

_____

_____

(2)

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



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

_____

_____

Number of squares = _____

(1)

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

_____

_____

_____

(1)

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

_____

_____

_____

Answer = _____ %

(2)

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

_____

(1)

(Total 7 marks)

12 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**

_____

_____

_____

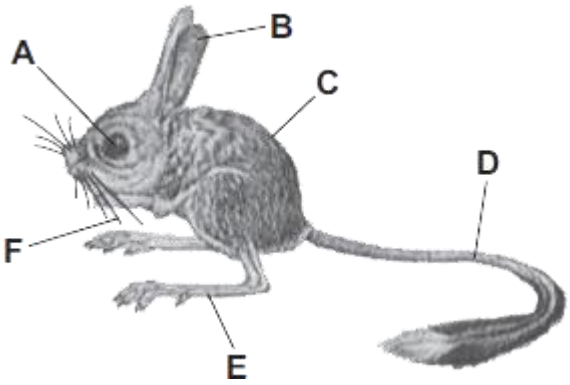
_____

_____

_____

(Total 3 marks)

13 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)

Mark schemes

1 (a) looks like a leaf

1

so predator less likely to / won't see it

allow 'camouflage' as alternative to either point

1

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

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

1

(ii) (giraffe) avoids being bitten by ants

allow ants are poisonous / have unpleasant taste

1

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

1

so predators think it has a sting

1

[6]

2 (a) camouflage / less visible

ignore insulation

1

(b) insulates / keeps warm

allow keeps out cold

ignore camouflage

1

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

ignore predation on owl

1

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

1

[4]

3 (a) brown (colour)

1

(b) (long) ears

1

(c) (long) horns

1

(d) (white) ring

1

[4]

4 (a) warmer / dryer

allow greenhouse effect / global warming

ignore wind

1

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

allow inheritance

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

ignore environment

1

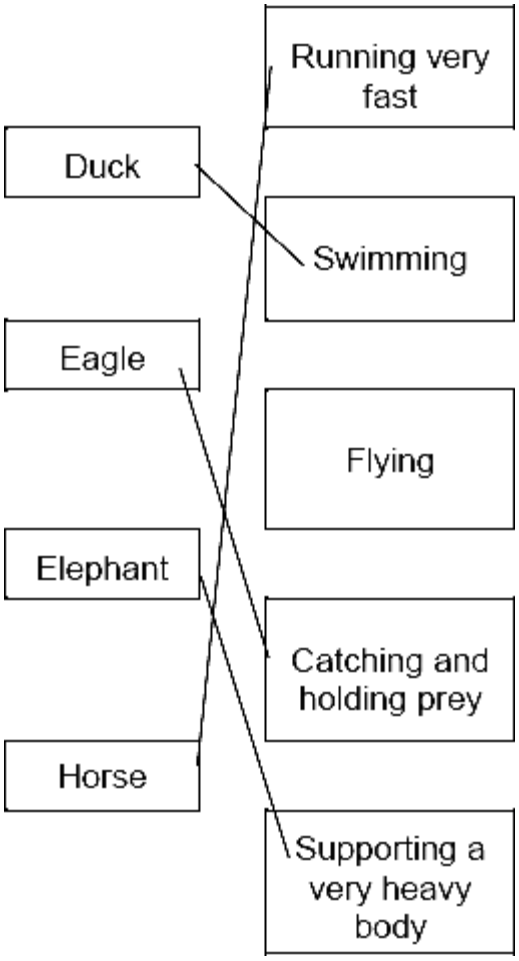
(ii) natural selection / evolution

allow survival of the fittest

1

[3]

5



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

[4]

6 (a) (i) carbon dioxide

1

(ii) sulfur dioxide

1

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

1

(ii) metals

1

(c) (i) pesticide

1

(ii) kill other animals

1

[6]

7 (a) large area

allow thin / large / big / flat / light

allow adaptations that cannot be seen eg internal air spaces

1

(b) (shape means that) snow falls off

1

(c) protect / stop it being eaten

1

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

ignore absorbs water from soil / air

ignore nutrients

1

[4]

8 (a) 60

*correct answer gains **2** marks*

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

2

(b) any **two** from

ignore temperature rise / global warming

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

  allow other environmental effects
- glacier melting / ice caps melting
- forest fires
- habitat destruction
- effect on organisms
- eg extinction / migration

2

[4]

9 (a) (i) 70

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

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

2

(ii) 6

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

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

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

2

(b) photosynthesis.

1

[5]

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

has thorns / prickles / points

accept sharp points

1

(these) hurt animal

allow frighten animal

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

1

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

camouflaged / looks like twig / disguised

allow blends in

ignore too small to see

1

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

allow animal does not eat twigs

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

1

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

red / colour

1

warns that insect might be poisonous / dangerous

allow inedible / tastes bad

1

[6]

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

1

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

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

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

1

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

allow fractions / decimals between 7 and 8

1

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

allow reference to counting squares with ½ cover or more

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

1

(iii) 28 – 32 (in range)

allow ecf

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

2

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

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

ignore pollution / soil / competition if unqualified

ignore temperature / wind

1

[7]

12 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]

13 (a) C **1**

(b) B **1**

(c) E **1**

(d) D **1**

(e) F **1**

[5]