Q1.

The Galapagos Islands are located in the Pacific Ocean.

Several species of birds called finches live on the Galapagos Islands.

These finches are very similar to each other.

Figure 1 shows two modern species of Galapagos finch and their classification.

Figure 1

Medium ground finch

Small ground finch

Classification group	Medium ground finch	Small ground finch
Kingdom	*Animalia*	*Animalia*
	Chordata	*Chordata*
Class	*Aves*	*Aves*
	Passeriformes	*Passeriformes*
	Thraupidae	*Thraupidae*
Genus	*Geospiza*	*Geospiza*
	fortis	*fuliginosa*

(a) Complete Figure 1 to give the names of the missing classification groups.

(2)

(b) Give the binomial name of the medium ground finch.

Use information from Figure 1.

_____

(1)

In each species of finch, there is a variation in beak depth.

Figure 2 shows how beak depth is measured.

Figure 2

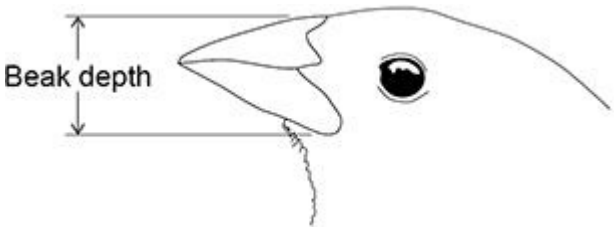
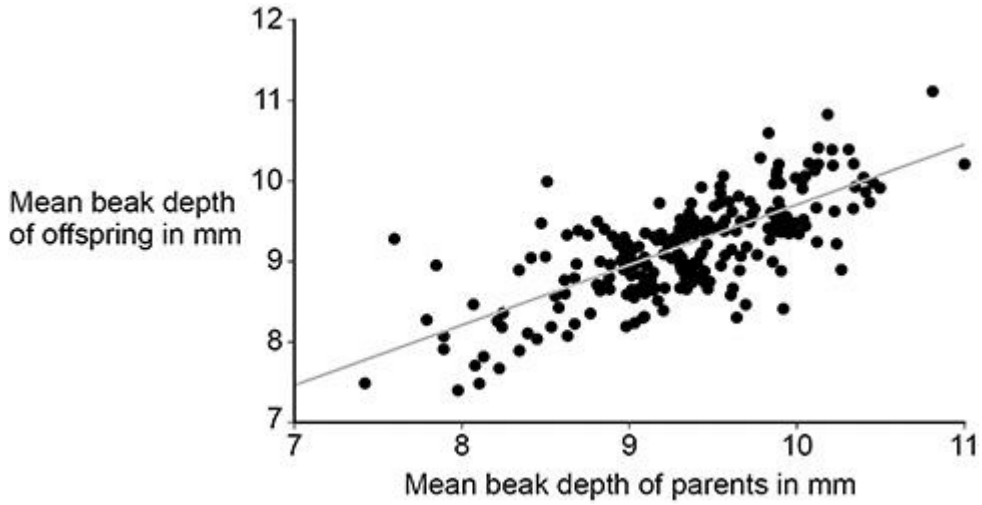


Figure 3 shows the relationship between the beak depth of parent birds and the beak depth of their offspring.

Figure 3



(c) Give evidence from Figure 3 that beak depth is an inherited characteristic.

_____

_____

(1)

(d) Scientists suggested that more than one gene controls beak depth.

Give evidence from Figure 3 to support the scientists' suggestion.

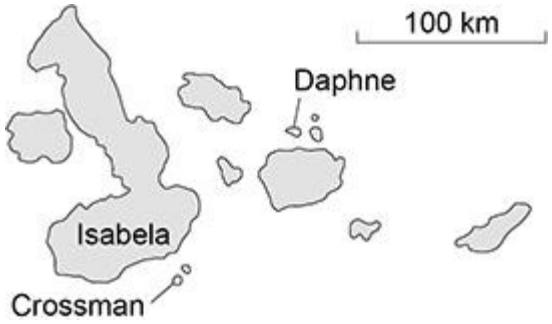
_____

_____

(1)

Figure 4is a map of the Galapagos Islands.

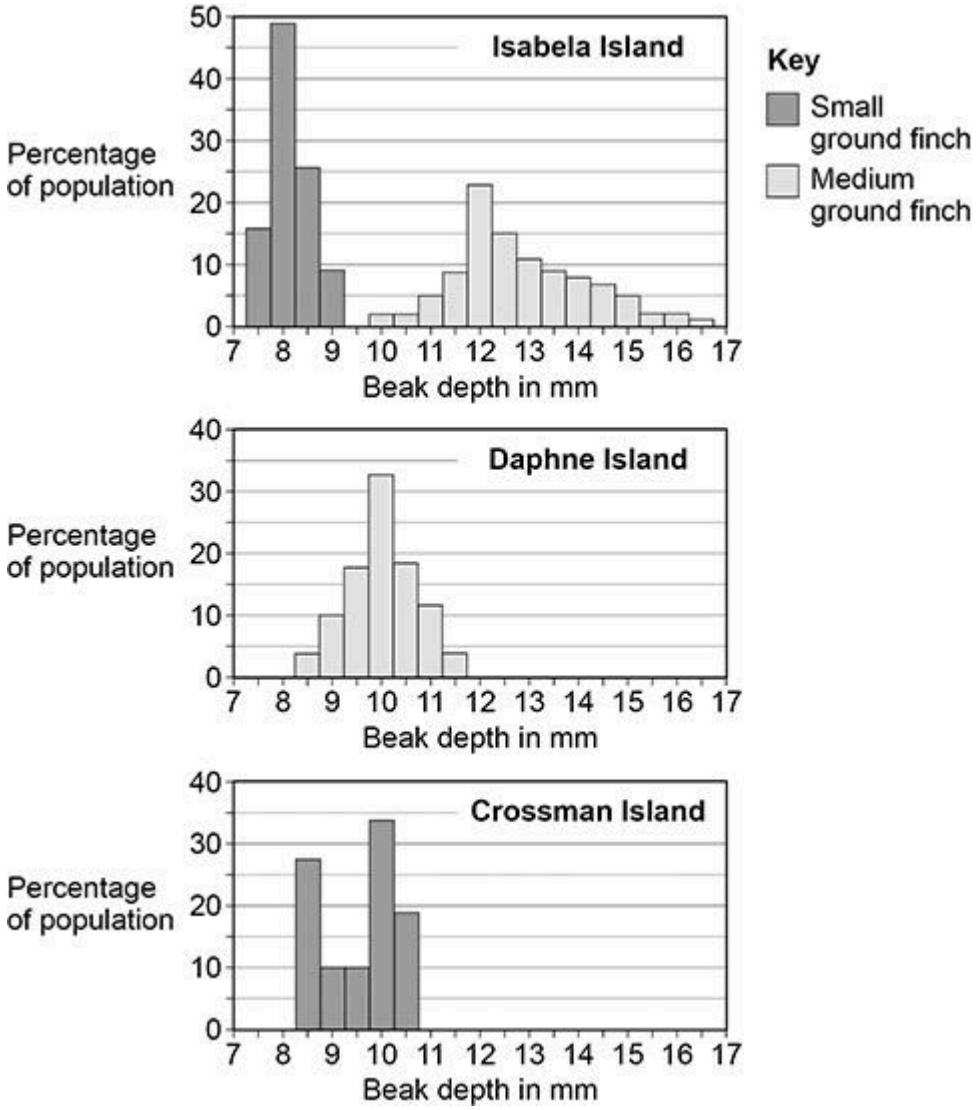
Figure 4



On Isabela Island, the medium ground finch and the small ground finch are found.
On Daphne Island, only the medium ground finch is found.
On Crossman Island, only the small ground finch is found.

Figure 5 shows how the beak depth of each species varies on each island.

Figure 5



The medium ground finch and the small ground finch both feed on seeds.

The size of seeds eaten by each bird depends on the depth of the bird's beak.

(e) The range of beak depth of medium ground finches on Isabela Island is different from the range on Daphne Island.

Explain what might have caused this difference.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(6)

(f) Figure 5 shows:

- the two species of finch live on Isabela Island
- only one of the species lives on Daphne Island
- only one of the species lives on Crossman Island.

Suggest why both species of finch are able to live on Isabela Island.

_____

_____

_____

_____

_____

_____

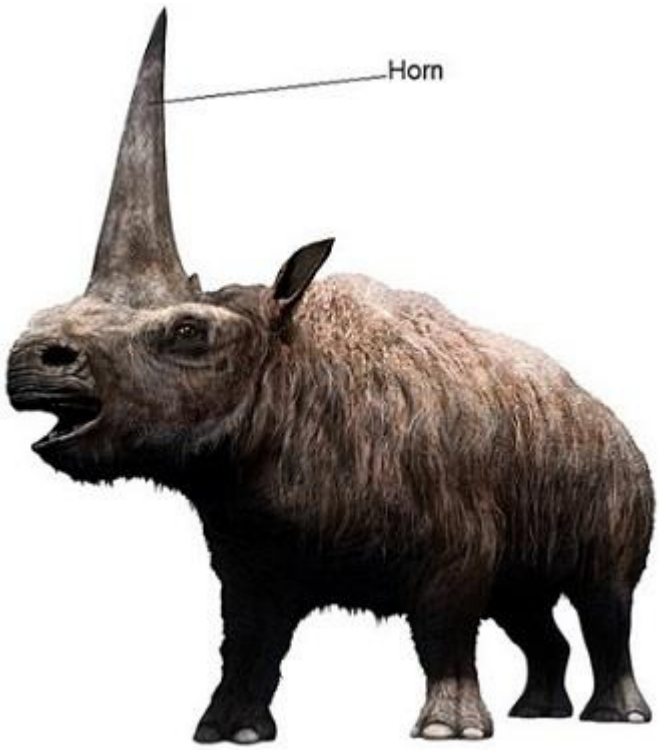
_____

(2)

(Total 13 marks)

Q2.

The image below shows what the extinct Siberian rhinoceros (*Elasmotherium sibiricum*) might have looked like.



(a) What is the genus of the Siberian rhinoceros?

Tick (✓) one box.

Elasmotherium ☐

Elasmotherium sibiricum ☐

sibiricum ☐

(1)

The 'three-domain system' of classification places all living organisms in one of three domains.

(b) Which domain was the Siberian rhinoceros in?

Tick (✓) one box.

Archaea ☐

Eukaryota ☐

Prokaryota ☐

(1)

(c) Who developed the 'three-domain system' of classification?

Tick (✓) one box.

Carl Woese ☐

Charles Darwin ☐

Gregor Mendel ☐

(1)

(d) The horn of the Siberian rhinoceros is estimated to have been 150 cm long.

Suggest one advantage of this adaptation to the Siberian rhinoceros.

_____

_____

(1)

(e) The only parts of the Siberian rhinoceros that have been found are fossilised bones.

Give one reason why only the bones of the body of the Siberian rhinoceros became fossils.

_____

_____

(1)

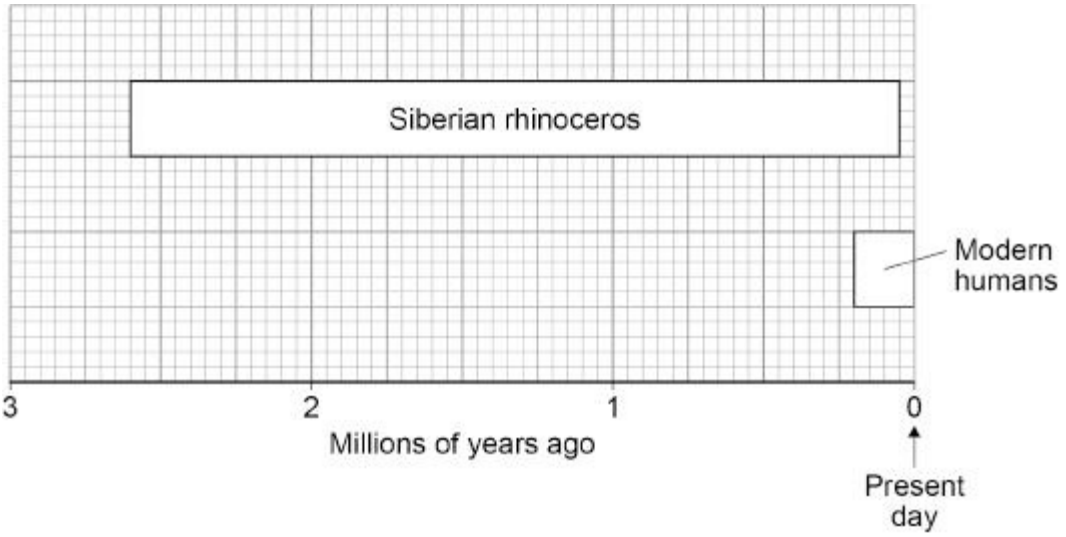
(f) Suggest how scientists can estimate when the Siberian rhinoceros was alive.

_____

_____

(1)

The below diagram shows when the Siberian rhinoceros existed and when modern humans existed.



(g) How many million years ago did the Siberian rhinoceros become extinct?

_____ million years ago

(1)

(h) Determine the time in years when both the Siberian rhinoceros and modern humans existed together.

Use the diagram above and your answer to Question (g).

_____

_____

_____

_____

Time = _____ years

(3)

(i) Suggest two factors that may have caused the extinction of the Siberian rhinoceros.

1 _____

_____

2 _____

_____

(2)

(Total 12 marks)

Q3.

The following table gives the classification of four plant species.

Group	Species 1	Species 2	Species 3	Species 4
Kingdom	*Plantae*	*Plantae*	*Plantae*	*Plantae*
Phylum	*Spermatophyta*	*Spermatophyta*	*Spermatophyta*	*Spermatophyta*
Class	*Monocotyledonae*	*Dicotyledonae*	*Monocotyledonae*	*Dicotyledonae*
Order	*Poales*	*Fabales*	*Poales*	*Scrophulariales*
Family	*Cyperaceae*	*Fabaceae*	*Poaceae*	*Scrophulariaceae*
Genus	*Eriophorum*	*Pisum*	*Poa*	*Antirrhinum*
Species	*angustifolium*	*sativum*	*annua*	*majus*

(a) Species 1 and 3 are the most closely related.

What information in the table above gives evidence for this?

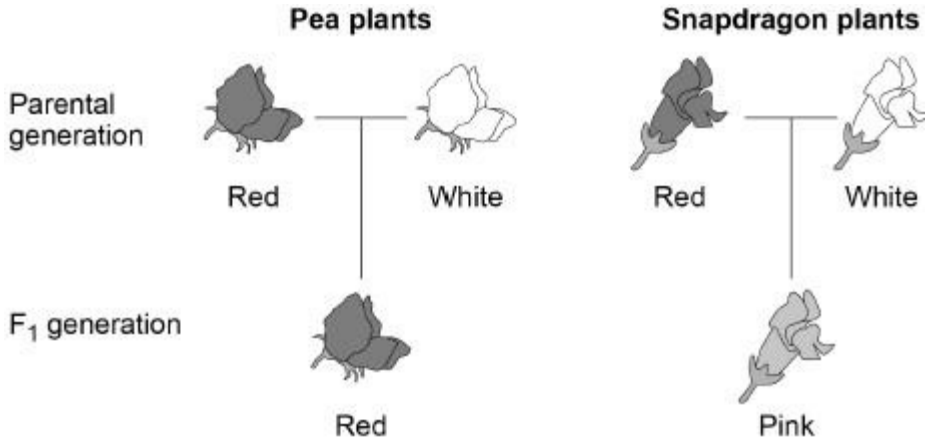
_____

_____

(1)

Figure 1 shows the inheritance of flower colour in two species of plant.

Figure 1



- In pea plants and in snapdragon plants, flower colour is controlled by one pair of alleles.
- In Figure 1 the parental generation plants are homozygous for flower colour.
- In heterozygous pea plants, the allele for red flower colour is dominant.
- In heterozygous snapdragon plants, the alleles for flower colour are both expressed.

Use the following symbols for alleles in your answers to parts (b) to (d):

Pea plants	Snapdragon plants
R = allele for red flowers	C^R= allele for red flowers
r = allele for white flowers	C^W= allele for white flowers

(b) What is the genotype of the red-flowered pea plants in the F1 generation?

_____

(1)

(c) What is the genotype of a white-flowered snapdragon plant?

_____

(1)

A gardener crossed two pink-flowered snapdragon plants.

(d) Draw a Punnett square diagram to show why only some of the next generation plants had pink flowers.
Identify the phenotypes of all the offspring plants.

(3)

(e) What percentage of the offspring would you expect to have pink flowers?

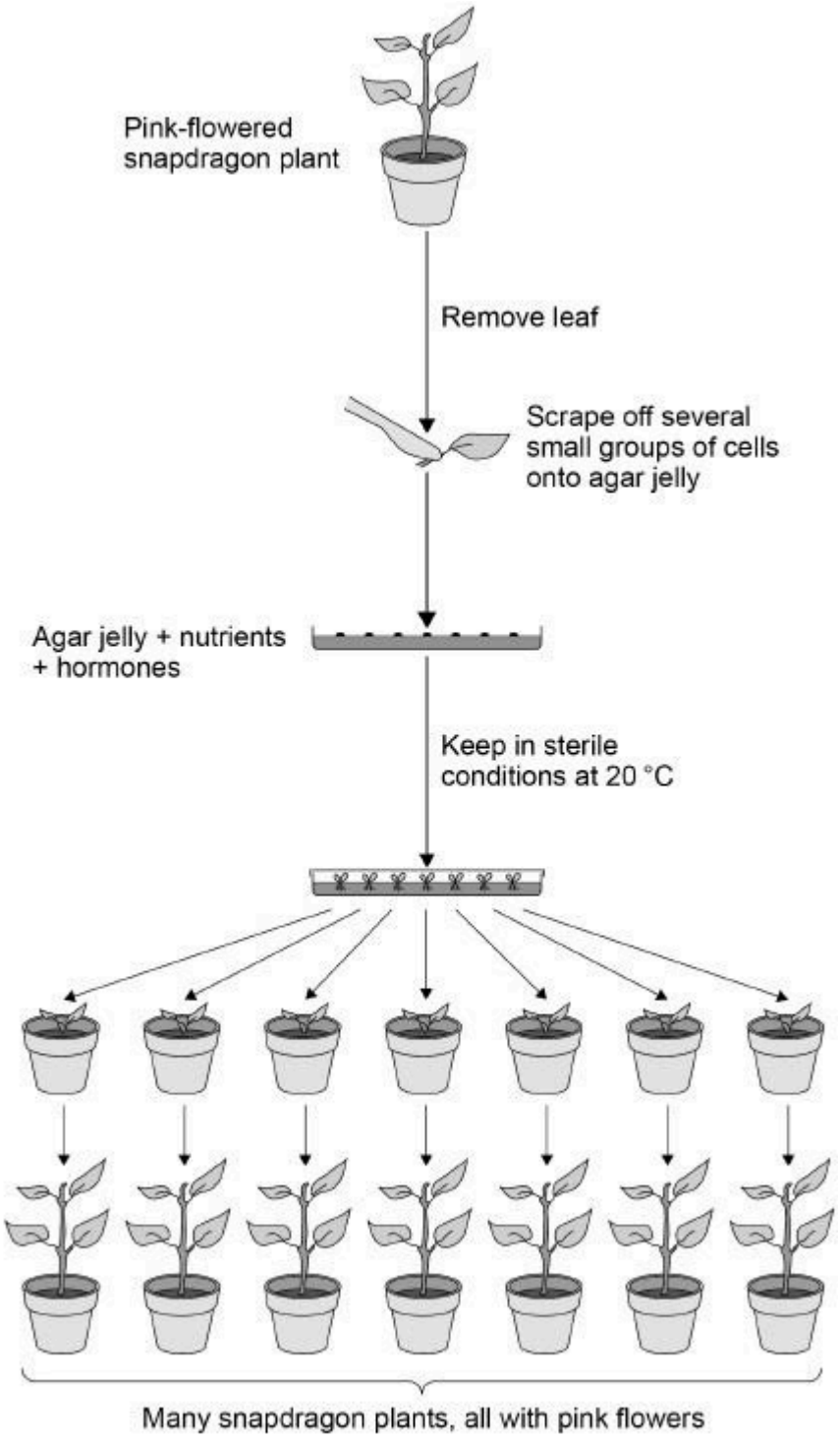
Percentage = _____%

(1)

Commercially, hundreds of pink-flowered snapdragon plants can be produced from one pink-flowered plant.

Figure 2 shows a tissue culture technique used for producing many plants from one plant.

Figure 2



(f) Give a reason for each of the following steps shown in Figure 2.

Several groups of cells are scraped off the leaf:

_____

_____

Nutrients are added to the agar jelly: _____

_____

_____

Hormones are added to the agar jelly: _____

_____

_____

The plant cells are kept in sterile conditions: _____

_____

_____

The plant cells are kept at 20 °C: _____

_____

_____

(5)

(g) Explain why the method shown in Figure 2 produces only pink-flowered plants.

_____

_____

_____

_____

_____

(2)

(Total 14 marks)

Q4.

Figure 1 shows a ring-tailed lemur.

Figure 1

The table below shows part of the classification of the ring-tailed lemur.

Classification group	Name
Kingdom	*Animalia*
Phylum	*Chordata*
	Mammalia
	Primates
	Lemuroidea
Genus	*Lemur*
	catta

(a) Complete the table above to give the names of the missing classification groups.

(2)

(b) Give the binomial name of the ring-tailed lemur.

Use information from the table above.

_____

(1)

Lemurs are only found on the island of Madagascar.

Madagascar is off the coast of Africa.

Scientists think that ancestors of modern lemurs evolved in Africa and reached Madagascar about 50-60 million years ago.
Today there are many species of lemur living on Madagascar.

Figure 2 shows information about water currents.

Figure 3 shows the distribution of three species of lemur on Madagascar.

Figure 2

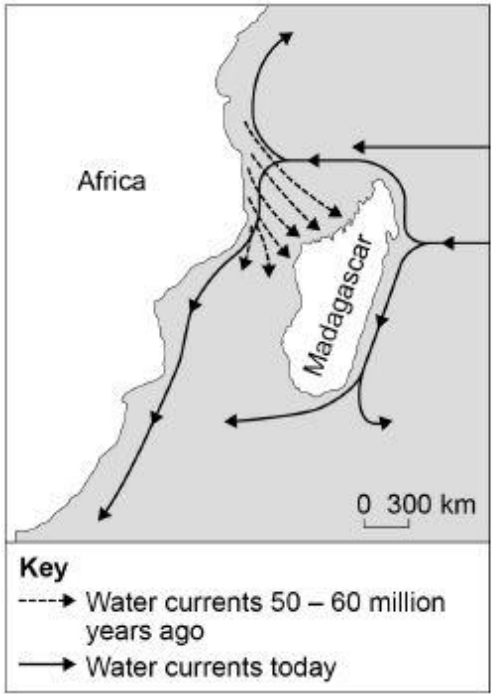
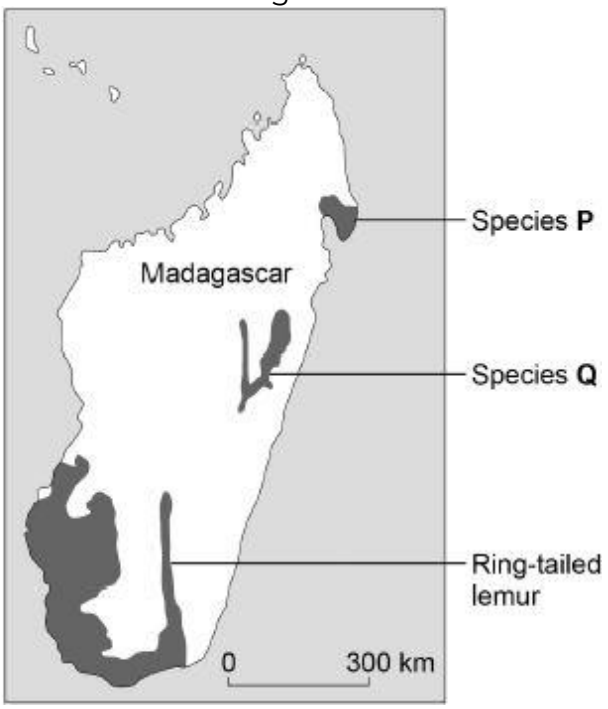


Figure 3



(c) Suggest how ancestors of modern lemurs reached Madagascar.

_____

_____

(1)

(d) Describe how the ancestors of modern lemurs may have evolved into the species shown in Figure 3.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(5)

(Total 9 marks)

Q5.

Living organisms are classified into the following groups:

- Kingdom Phylum Class Order Family Genus Species

Which scientist first suggested this type of classification system?

(a) Tick one box.

Alfred Russel Wallace ☐

Carl Linnaeus ☐

Charles Darwin ☐

Gregor Mendel ☐

(1)

The stone plant, *Lithops bromfieldi*, is adapted to live in very dry deserts.

Figure 1 shows several stone plants.

Figure 1

(b) Give the genus to which the stone plant belongs.

_____

(1)

(c) The stone plant has many adaptations that help it to survive in the desert.

Draw one line from each adaptation to how the adaptation helps the stone plant to survive.

Adaptation	How the adaptation helps survival
	Can trap a lot of light
Plants look like stones	Absorb water from deep in the ground
Leaves with thick, waxy cuticles	Help cross-pollination
Many long, branching roots	Are not easy to see and so are not eaten
Thick, fleshy leaves	Reduce water loss
	Store water

(4)

The jerboa is a small desert animal.

Figure 2 shows a jerboa.

Figure 2

The jerboa is adapted for survival in the desert.
The jerboa spends the daytime in its underground burrow.
The jerboa only leaves its burrow to look for food during the night.

(d) Describe how these adaptations help the jerboa to survive in the desert. _____

_____

_____

_____

(2)

(e) What type of adaptations are described in Question (d)?

Tick one box.

Behavioural ☐

Functional ☐

Structural ☐

(1)

(Total 9 marks)