## SECTION A

**Answer ALL questions.**

1. (a) For a laboratory experiment, students prepared slides of a plant cell and an animal cell for microscopic examination. For the animal cell, a sample was taken from the cheek and the plant cell sample was extracted from the epidermis of an onion bulb.

List FOUR structures that are common to BOTH an animal cell and a plant cell.

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**(4 marks)**

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(b) Suggest an aim for the experiment outlined in (a).

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**(1 mark)**

(c) In the box below, draw a large, labelled diagram of what you expect to see when ONE plant cell is examined at high power magnification.

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**(5 marks)**

(d) When conducting the experiment, the students used **methylene blue** and **iodine**. State ONE reason why these substances were used in the experiment.

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**(1 mark)**

(e) Suggest TWO precautions which the students should take when conducting the experiment outlined in (a) **on page 4**.

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**(2 marks)**

(f) The students were not able to see chloroplasts when they looked at the sample obtained from the epidermis of the onion bulb. Suggest a reason why the chloroplasts were NOT visible in the onion sample.

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**(1 mark)**

(g) Animals and plants live in different habitats and can have physical adaptations which allow them to survive in their environment. Elephants and cacti are both adapted to survive in the desert. Complete Table 1 below to suggest THREE ways in which a cactus plant is adapted to survive in the desert. An example has been provided for you, using the elephant.

**TABLE 1: ADAPTATIONS**

| Organism | Adaptation |
|---|---|
| Elephant | Very large ears that it flaps to keep cool. |
| Cactus | 1. .....<br>.....<br>2. .....<br>.....<br>3. .....<br>..... |

**(3 marks)**



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(h) Figure 1 is a food web showing the relationship between organisms in an ecosystem.

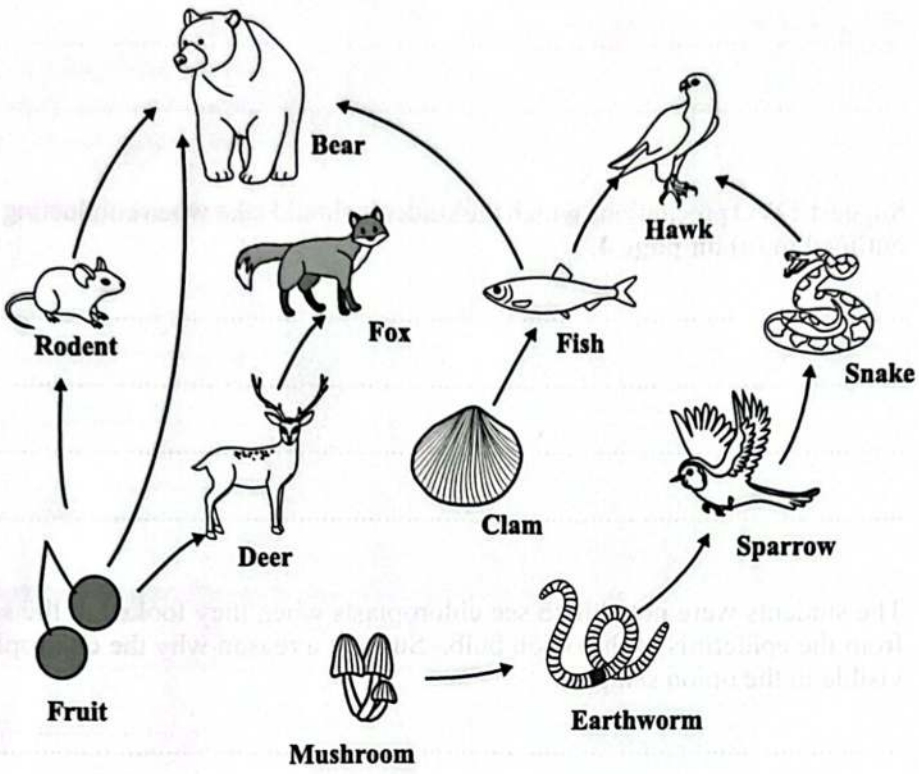



**Figure 1. Food Web**

Using the food web in Figure 1, identify the following.

(i) THREE carnivores

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(ii) ONE omnivore

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(iii) ONE herbivore

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**(5 marks)**

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(i) Using the food web in Figure 1 **on page 6**, identify a decomposer and explain its role in the food web.

(i) Decomposer

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**(1 mark)**

(ii) Decomposer's role in the ecosystem

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**(2 marks)**

**Total 25 marks**

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**2.** Pedro was playing with his puppy in the garage, and it kept running and knocking over his mum's favourite potted plant. To prevent the plant from being damaged, he placed it in a nearby cupboard. After playing, Pedro went inside to have lunch and forgot to remove the plant from the cupboard. The plant therefore remained in the cupboard for two days before Pedro remembered to remove it.

(a) In addition to sunlight, plants need other substances to survive. Complete Table 2 below to show TWO **other** substances which Pedro's plant would need to survive and to state the route by which EACH substance enters the plant.

**TABLE 2: SUBSTANCES REQUIRED BY PLANTS AND THEIR ROUTE OF ENTRY**

| Substance | Route of entry into the plant |
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**(4 marks)**

(b) Explain ONE biological implication of leaving the potted plant in the cupboard for 48 hours.

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**(2 marks)**

(c) Pedro was surprised that the plant did not die during the two days in which it was left in the cupboard. Explain to Pedro why the plant did not die.

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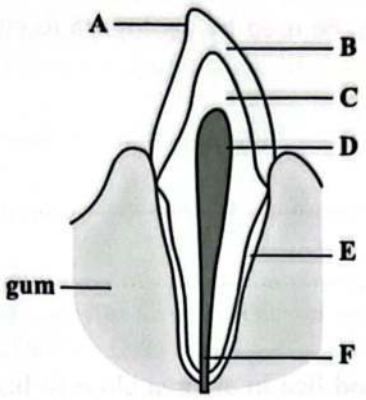
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**(3 marks)**



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(d) Figure 2 below shows the internal structure of a typical tooth. State the names of the structures labelled A–F.




A .....

B .....

C .....

D .....

E .....

F .....

**(3 marks)**

(e) After lunch, Pedro went outside to play cricket with his friends. During the game, he misjudged the speed at which the ball was coming to him and the ball hit him on the side of his face. Due to the impact, Pedro lost one of his teeth a few days later.

Suggest THREE consequences which may occur because of Pedro's premature tooth loss.

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**(3 marks)**

**Total 15 marks**

GO ON TO THE NEXT PAGE

3. (a) Ecologists utilize sampling techniques to study the organisms present in an ecosystem. The capture-recapture method is an example of one method that can be used to estimate the size of a population of animal species.

List THREE **other** methods which may be used by ecologists to study the organisms present in an ecosystem.

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**(3 marks)**

(b) Jacob noticed that there were many wood lice in an area close to his home. Using the capture-recapture method, he collected 20 wood lice and marked their backs with a small amount of paint. He released the wood lice back where he found them and went to play with his friend. One week later, he returned to the area and captured 50 wood lice and noticed that 10 of them were marked with paint.

Using a suitable equation, estimate the number of wood lice in Jacob's area.

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**(2 marks)**

(c) Jacob shared the wood lice estimate from (b) with his friend. His friend believed that Jacob made a few assumptions for the estimate to be realistic. Suggest TWO assumptions that Jacob may have made when using the capture-recapture method to determine the number of wood lice in this area.

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**(2 marks)**

(d) The distribution and behaviour of wood lice in an ecosystem is closely related to the abiotic factors present. List FOUR abiotic factors which may influence an ecosystem.

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**(4 marks)**

(e) A large construction project was set to begin within Jacob's neighbourhood. Suggest FOUR **negative** environmental consequences that could result from the construction project.

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**(4 marks)**

**Total 15 marks**

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## SECTION B

**Answer ALL questions.**

4. (a) Define the term 'fertilization'.

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**(2 marks)**

(b) List FOUR features that may be used to determine if a flower is wind-pollinated.

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**(4 marks)**

(c) Tom and Jenny were in a heated argument concerning the biological classification of the cucumber. Tom said the cucumber is a fruit while Jenny insisted that it is a vegetable. As a biologist and mediator in this argument, explain why Tom's classification is correct.

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**(3 marks)**

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(d) Two botanists (plant experts) from a university visited a distant, little-known island, Micoe, in search of new specimens for their laboratory. They were astonished to find plant species similar to the ones in their collection even though Micoe was hundreds of miles away from their country and university.

Explain THREE ways by which the familiar plants could have arrived on Micoe.

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**(6 marks)**

**Total 15 marks**

**5.** (a) Define the following terms.

(i) Artificial selection

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**(2 marks)**

(ii) Codominance

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**(1 mark)**

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(b) Mr Banks grows flowers commercially on his farm and daily provides pink snapdragons for his wife, Mrs Banks, who is a floral designer.

The snapdragon has two alleles for flower colour. The allele $C^W$ produces white flowers, while the allele $C^R$ produces red flowers. If these alleles show codominance, state the **genotype** of EACH colour of snapdragon produced.

White flowers

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Pink flowers

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Red flowers

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**(3 marks)**

(c) (i) Explain, using a genetic diagram, ONE way by which Mr Banks utilizes his flower farm to continuously supply his wife with pink snapdragons. In your answer, state which flowers will be crossed.

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Explanation

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**(4 marks)**

(ii) Determine the phenotypic ratios obtained from the genetic diagram used in (c) (i). Express your answer as a percentage.

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**(2 marks)**

(d) Despite strict farm procedures, Mr Banks discovered a small patch of yellow snapdragons amidst the white snapdragons. He was very surprised to see them there because he did not plant them. Suggest a biological explanation that you can give Mr Banks for the presence of the yellow snapdragons.

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**(3 marks)**

**Total 15 marks**

6. (a) Define the following terms and state ONE example of EACH.

(i) Autotrophic nutrition

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**(2 marks)**

(ii) Heterotrophic nutrition

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**(2 marks)**

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(b) Name TWO minerals that are important in autotrophic nutrition.

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**(2 marks)**

(c) Mark and Ryan, two students studying agriculture science, were observing the growth of black-eyed peas in the school garden. After taking notes on the parts of the plants above ground, they uprooted a few of them and noticed small swellings on their roots. These swellings were not characteristic of other plant species they had studied.

Explain the significance of these small swellings (root nodules) on the pea plants.

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**(3 marks)**

(d) Ants sometimes cut pieces of hibiscus leaves and carry them to their nests. They chew but do not swallow the leaves. The fungus then grows on the chewed leaves in the ants' nests. The ants take care of the fungus and when it is mature, they feed their larvae with the fungus.

Explain the nature of the relationship between the fungus and the ants.

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**(3 marks)**

(e) Small birds also feed on the hibiscus plant. Explain why this relationship CANNOT be described as a symbiotic one.

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**(3 marks)**

**Total 15 marks**

**END OF TEST**

**IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK ON THIS TEST.**