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QUESTION 2

(a) Complete the table below by ticking (√) the appropriate group to which **each** of the listed elements required by plants belongs.

Element	Group	
	Microelement	Macroelement
Hydrogen		
Copper		
Magnesium		
Zinc		
Phosphorus		
Manganese		
Boron		
Nitrogen		
Carbon		
Oxygen		

[10 marks]

(b) State:
(i) **three** differences between definition of herbivore and a carnivore;
[3 marks]

(ii) **four** differences between the definition of a human and a goat.
[4 marks]

(c) What are milk teeth? [3 marks]

This question was also very popular among candidates.

They were able to complete the table by ticking the appropriate group to which each of the listed elements required by plants belongs.

They were also able to state the differences between the dentition of humans and a goat. Some candidates showed weaknesses in stating the differences between the dentition of a herbivore and a carnivore.

Some candidates could not also define and explain milk teeth.

The expected answers are:

2. (a) Table

Element	*Group*	
	Microelement	***Macroelement***
Hydrogen		√
Copper	√	
Magnesium		√
Zinc	√	
Phosphorus		√
Manganese	√	
Boron	√	
Nitrogen		√
Carbon		√
Oxygen		√

(b) Differences between the dentition of a

(i) Herbivore and Carnivore

Herbivore	*Carnivore*
• Presence of diastema	absence of diastema;
• Absence of canine	presence of canine;
• Absence of carnassial teeth	presence of carnassial teeth;
• Ridged molar	cusped molar.

Note: points must correspond to score.

(ii) Human and Goat

Human	*Goat*
• Absence of diastema	presence of diastema;
• Presence of canine	absence of canine;
• Presence of upper incisor	absence of upper incisor;
• Absence of dental pad	presence of dental pad;
• Presence of eight premolar	presence of twelve premolars;
• Equal number of incisors in upper and lower jaw	Presence of more incisors on lower jaw.

Note: points must correspond to score.

(c) Milk teeth

- Are the first set of teeth grown by the infants of a human;
- are twenty in number;
- made up of incisors, canines and molars;
- premolars are absent;
- the dental formula is I CM **or** I C PM;
- they are also known as primary/temporal/deciduous teeth/they are shed and replaced by permanent teeth.

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QUESTION 3:

(a)(i) What is an ecological niche? [2 marks]
(ii) State **five** roles played by a mango tree in its ecological niche. [5 marks]
(b)(i) State **two** reasons why ecologists use sampling techniques in population studies. [5 marks]
(c) Name four types of fingerprints in humans. [4 marks]
(d) (i) Name the plant used by Gregor Mendel in his experiment. [1 mark]
(ii) State **two** reasons why the plant named in 3(d)(i) was used. [2 marks]

This question was quite popular among candidates. The candidates that attempted this question scored some good marks because some of them could define ecological niche and state the role of a mango tree in its ecological niche. The candidates that performed poorly lost marks to their inability to state the role of a mango tree in its ecological niche.

Only a few candidates could explain the reason why ecologists use sampling techniques in population studies and name examples of sampling techniques in population studies.

Some candidates could not name the types of fingerprints.

Some candidates that could name the plant used by Gregor Mendel in his experiment could not spell correctly and hence, lost marks.

Only a few candidates could state the reasons why the plant was used in his experiment.

The expected answers are:

(a) (i) Ecological niche
Where an organism normally lives; and the role it plays in an ecosystem/community.

(ii) Roles of a mango tree in its ecological niche
- absorbs sunlight for photosynthesis;
- absorbs water/mineral salts from the soil;
- provides shelter for animals/other plants;
- acts as support for creepers;
- produces fruits/food/serves as food;
- serves as fuel source for animals;

- covers the ground with dead leaves that enrich the soil.

(b) (i) Reasons ecologists use sampling techniques in population studies
- Counting individuals could be impossible/difficult in fast moving animals;
- Counting individuals could be tedious;
- Counting individuals could be time consuming/use of technique saves time;
- The terrain/habitat could be difficult to reach.

(ii) Examples of sampling techniques used in population studies
- Quadrat method; - Random sampling method;
- Line transect method; - Systematic sampling method;
- Sweep net method; - Convenience sampling;
- Pitfall trap method; - Cluster sampling;
- Tullgren funnel method; - Stratified sampling;
- Light trap method.

(c) Types of fingerprints
- Arch/tented arch;
- Loops/double/central pocket/ulna/radial loop;
- Whorls/accidental/plain whorl;
- Compound.

Note: Spellings must be correct to score.

(d) (i) Plant used by Gregor Mendel
Pea plant/Garden pea plant/*Pisum sativum*.

(ii) Reasons why the plant was used
- It is self-pollinated/flowers are bisexual;
- Has a short life cycle;
- Produces many offspring in one cross;
- Presence of distinct physical characters that are easily recognizable.

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QUESTION 4:

(a) (i) What are conservative laws? [3 marks]
(ii) State **three** conservative laws. [3 marks]
(b) (i) State **two** reasons why animals are poached. [2 marks]
(ii) Name **five** animals that are commonly poached. [5 marks]
(c) State **four** effects of excessive use of the forest. [4 marks]
(d) Explain briefly the following terms:
(i) blood transfusion; [2 marks]
(ii) antigen. [2 marks]

The question was not popular among candidates.

Many candidates could not give the correct Parental gamete horizontal (PGH) and Parental game vertical (PGV) thereby getting wrong answers in Offspring (F1) in the punnett square.

In question 4(b), many wrote 9:3:3:1 or 1:3:3:9 as the number of offspring that would have the required phenotypic characters.

Most candidates could not differentiate somatic from reproductive cells and so gave wrong number of chromosomes in question 4(c).

Many candidates loss marks in this question due to poor knowledge of genetics and poor interpretation of the question.

The expected answer is as follows:

(a) Punnett squares of a dihybrid cross

X	**Bt**	**Bt**	**Bt**	**Bt**
bT	BbTt	BbTt	BbTt	BbTt
bT	BbTt	BbTt	BbTt	BbTt
bT	BbTt	BbTt	BbTt	BbTt
bT	BbTt	BbTt	BbTt	BbTt

Parental gametes horizontal (PGH): Bt 4x½ [2 marks]
Parental gametes vertical (PGV): bT 4x½ [2 marks]
Offspring (F1) 16x½ [8 marks]

(b) Offspring with:
(i) black fur and short tail – 0
(ii) brown fur and long tail – 0
(iii) black fur and long tail – 16
(iv) brown fur and short tail – 0

(c) Number of Chromosomes in
(i) Pollen grain: 10
(ii) Guard cell: 20
(iii) Ovule: 10
(iv) Root cell: 20

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QUESTION 5:

(a) (i) State **three** difference between the alimentary canals of earthworm and cockroach. [3 marks]

(ii) State **three** similarities between the alimentary canals of earthworm and cockroach. [3 marks]

(b) The diagram below is an illustration of a biological cycle. Study it and answer questions 5(b)(i) to 5(b)(iii).

(i) Name the biological cycle. [1 mark]

(ii) Explain briefly three roles played by plants and animals in the cycle. [3 marks]

(iii) Name the processes that occur in X,Y and Z. [3 marks]

(c) Complete the table below.

	Organ associated with excretion in humans	**Three** diseases **each** that affect the organ
(i)		
(ii)		

[8 marks]

(d) (i) what is decay of organic matter? [2 marks]

(ii) Name two groups of organisms that cause decay of organic matter. [2 marks]

(iii) State **one** other factor that causes decay. [1 mark]

(iv) Name the biological cycle that involves decay. [1 mark]

(e) Explain briefly the mode of nutrition in carnivorous plants. [3 marks]

This was a compulsory question and candidates performed relatively well in it.

Many candidates were able to state similarities between the alimentary canal of earthworm and cockroach.

Some of them were also able to name the processes in the diagram and state the roles played by plants and animals.

They could also complete the table on the organ associated with excretion and the corresponding diseases of the organs named.

Candidates were able to name groups of organisms that cause decay of organic matter.

However, many candidates showed weaknesses in explaining the mode if nutrition in carnivorous plants.

The expected answers are:

5. (a) (i) Differences between the alimentary canals of an earthworm and a cockroach

Earthworm	*Cockroach*
• Simple/sucking mouthparts	elaborate/biting/chewing mouthparts;
• Alimentary canal not divided/ simple	alimentary canal divided into fore gut, mid gut and hind gut/developed;
• Absence of mesenteric caecum	presence of mesenteric caecum;
• No malpighian tubules attached	malpighian tubules attached to canals.

Note: points must correspond to score.

(ii) Similarities

Both have

- Mouth;
- Crop;
- Gizzard;
- (Small) intestines;
- Oesophagus;
- Anus.

Note: Spellings must be correct to score.

(b) (i) Name of biological cycle

Water

(ii) Roles of plants and animals in the cycle

- Plants and animals produce water as a by-product of respiration;
- plants give-off water through transpiration;
- animals give off water by perspiration/sweating/urinating/excretion;
- plants absorb water/animals drink water for body metabolism.

(iii) Processes that occur in **X**, **Y** and **Z**

X - Condensation
Y - Evaporation
Z - Evaporation

Note: Spellings must be correct to score.

(c) Table

Organ associated with excretion in humans	*Three diseases that affect the organ*
Kidneys	Nephritis; kidney stones; diuresis; kidney cancer; polycystic kidney disease; diabetes (insipidus); any correctly named disease.
Liver	Cirrhosis; hepatitis; jaundice; dropsy; gall stones; diabetes (mellitus); cancer, any correctly named disease.
Skin	Scabies; ringworm; acne; eczema; boil; leprosy; cancer; dermatitis; any correctly named disease.
Lungs	Bronchitis; cancer; asthma; tuberculosis; pulmonary fibrosis; any correctly named disease.

Note: (i) spelling of organs and diseases must be correct to score;
(ii) organ must be correct for the disease to score;
(iii) not more than three diseases should score for each of the two organs
(iv) the total mark is 8marks.

(d) (i) Decay
Is the breakdown of complex organic matter; into small/simple compounds; so that their nutrient can be absorbed.

(ii) Group of organisms that bring about decay
Saprophytes/fungi; bacteria; detritivores/decomposers.

(iii) Factor that brings about decay

- Temperature/Heat/warmth;
- Osmotic pressure;
- Amount of water;
- Amount of oxygen.

(iv) Biological cycle that involves decay
Carbon; Nitrogen

(e) Mode of nutrition in carnivorous plants

- They obtain nutrients from trapped insects and other small animals;
- The trapped insects are digested;
- And the amino acids are absorbed;
- Carnivorous plants grow on soils that are poor in nitrogen;
- Animal proteins supplement the nitrogenous compound

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QUESTION 1:

A sample of human blood was put in a test tube and allowed to spin in a centrifuge. The components of the blood sample were **clearly** separated.

(a) (i) What is a cell? [2 marks]

(ii) Name **three** scientists that are associated with the discovery of the cell. [3 marks]

(b) (i) Make a diagram, 6 *cm* to 8 *cm* long of a plant cell and label **only** the organelle responsible for cell reproduction. [7 marks]

(ii) Name **one** blood cell in humans that does **not** have the organelle labelled in 1(b)(i). [1 mark]

(iii) What is the biological implication of the cell named in 1(b)(i). [1 mark]

(c) List **six** organelles found in a plant cell. [6 marks]

Observation

This question was very popular among candidates. Some of the candidates that answered this question had a range of good marks because they were able to define a cell and name the scientists associated the discovery of the cell. The candidates that performed poorly lost marks to poor spellings.

Some candidates were able to make good diagrams of a plant cell but some were unable to identify and label the organelle responsible for cell reproduction.

Many candidates could not name the blood cell in humans that does not possess a nucleus because they could not comprehend the question, neither could they give the implication of the cell not possessing the organelle for cell reproduction.

Many candidates were able to list the organelles found in a plant cell.

The expected answers are:

(a) (i) Cell

Is the basic/smallest structural/building block; and functional unit; of life.

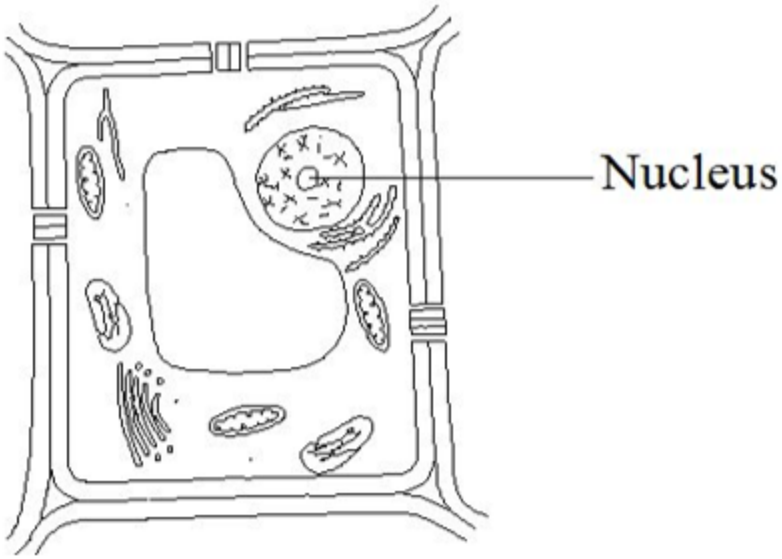
(ii) Scientists that are associated with the discovery of the cell

- Robert Hooke;
- Matthias Schleiden;
- Theodor Schwann;

- Rudolf Virchow;
- Felix Dujardin.

Note: Spellings of complete names must be correct to score.

(b) (i) Diagram of a plant cell



Title (TL) Diagram of plant cell

Quality (Q)
Size (Sz) (6cm to 8cm long)
Clarity of lines (CL) (lines not broken, not wooly)
Neatness of label (NL) (ruled guideline, horizontal label)

Details (D)
Rectangular/regular shaped cell (RS)
Central vacuole shown (CV)

Label (L)
Nucleus

Note: Spelling must be correct to score.

(ii) Blood cell in humans that does not possess nucleus

Red blood cell/erythrocyte

Note: Spelling must be correct to score.

(iii) Biological implication of the cell not possessing a nucleus

- It has a short life span;
- Unable to reproduce;
- Gives room for carriage of more oxygen.

(c) Organelles found in a plant cell

- Nucleus;
- Chloroplast;
- Rough Endoplasmic Reticulum;
- Smooth Endoplasmic Reticulum;
- Vacuole;
- Lysosome;
- Ribosome;
- Golgi body;
- Mitochondrion.

Note: Spellings must be correct to score.

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