NAME: …… CLASS: ……. ADM: …….
APRIL 2025 HOLIDAY ASSIGNMENT
BIOLOGY
FORM 3

ECOLOGY

1. Differentiate between the following concepts.
i) Autecology and Synecology. (2mks)

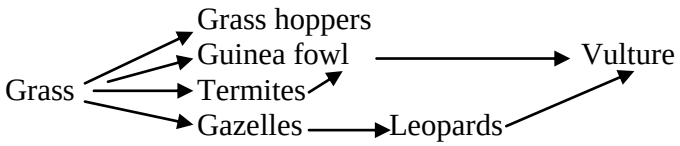
ii) Carrying capacity and Biomass. (2mks)

iii) Population and Community. (2mks)

iv) Food chain and Food web. (2mks)

v) Habitat and Ecological niche. (2mks)

2. The figure below shows a feeding relationship in an ecosystem.



- Write down the food chains in which guinea fowl act as primary consumer. (1mk)

- Write the food chain where the leopards act as secondary consumer. (1mk)

3. In an estimate the population size of crabs in a certain lagoon trap were laid at random, 400 crabs were caught , marked and released back into the lagoon, four days later, traps were laid again and 374 crabs were caught. Out of the 374 crabs, 80 were found to have been marked.
i) Find the population of the crabs. (3mks)

ii) State 3 assumptions that were made during the investigations. (1mk)
iii) What is the name given to this method of estimating the population size. (1mk)
4. The following table shows the estimated number of organism recorded in a drum.

Organism	number
Small fish	3500
Microscopic algae	120000
Crocodile	95
Large fish	950
Mosquito larvae	8900

i) Construct a possible food chain at the ecosystem. (2mks)

ii) Construct a pyramid of number of the ecosystem.

iii) Which organism would be depleted first in this ecosystem. Give a reason. (1mk)

5. i) Define Nitrogen cycle. (1mk)

ii) State and explain 3 forms of Nitrogen fixation. (6mks)

iii) Name bacteria that convert. (2mks)
a) Ammonia to nitrate.
b) Nitrite to nitrate.

iv) State one importance of denitrification. (1mk)
6. Differentiate between nitrifying bacteria and nitrogen fixing bacteria. (2mks)
7. State 3 ways in which the prey are adapted to escape the predators. (3mks)
8. State 5 adaptations of aerenchyma tissues. (1mk)
9. State 3 characteristics of a dessert habitat. (3mks)

Excretion and Homeostasis

1. Explain the following: -
   i) Fresh water fish excrete ammonia
   ii) Glucose is absent in urine yet present in glomerular filtrate
2. (a) State **two** structural modification of the kidneys of deserts animals like kangaroo rat.
   (b) Describe how ingestion of very salty food may reduce the amount of water excreted in urine.

3. A student mixed a sample of urine from a person with Benedict's solution and heated, the colour changed to orange.
   a. What was present in the urine sample?
   b. What did the student conclude on the health status of the person?
   c. Which organ in the person may not be functioning properly?
4. (a) If the human pancreas is not functional: -
   (i) Name the hormone which will be deficient
   (ii) Name the disease the human is likely to suffer from

   (b) What is diuresis?

5. State **one** structural adaptation of nephron in the kidney of a desert mammal
6. Name the nitrogenous wastes excreted by the following organisms: -

Animal	**Nitrogenous Waste**
Desert mole	
Marine fish	
Tilapia	

7. The table below shows description of sizes of glomeruli renal tubules of two animals which are living in different environments

	Animal X	**Animal Y**
Glomeruli	Large and few	Small and many

Renal tubules	Short	Long

(a) Name the likely environment in which each animal lives :

(i)Animal X

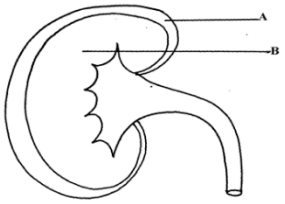
(ii) Animal Y

(b) What role does vasoconstriction play in thermoregulation?

8. The table below shows the approximate percentage concentration of various components in blood plasma entering the kidney, glomerular filtrate and urine of a healthy human being

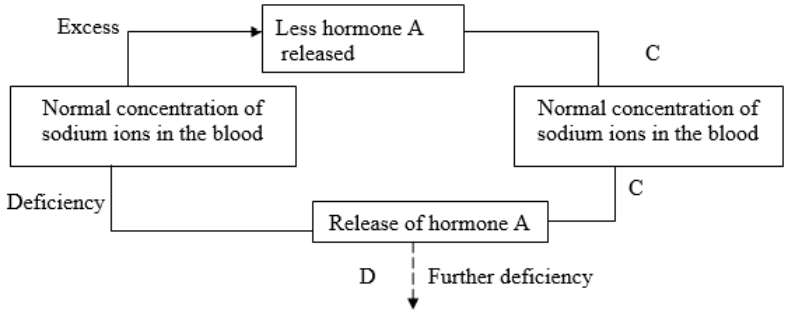
Component	**Plasma**	**Glomerular filtrate**	**Urine**
Water	90	90	94
Glucose	0.1	0.10	0.00
Amino acids	0.05	0.05	0.00
Plasma proteins	8.0	0.00	0.00
Urea	0.03	0.03	2.00
Inorganic ions	0.72	0.72	1.50

   a. Name the process responsible for the formation of glomerular filtrate
   b. What process is responsible for the absence of glucose and amino acids in urine?
   c. Explain why there are no plasma proteins in the glomerular filtrate
9. What is the importance of sebaceous glands in the human skin?
10. Explain why sweat accumulates on a person's skin in a hot humid environment
11. Distinguish between diabetes mellitus and diabetes insipidus.
12. State **two** processes through which plants excrete their metabolic wastes.
13. The figure below shows a vertical section through a mammalian kidney.



   a. Label the parts A and B
   b. Which part is the Bowman's capsule found?
14. (a) Explain the effects of the production of large amounts of Antidiuretic hormone in the human body
    (b) State **two** functions of the loop of Henle

15. Study the homeostatic scheme below:



a. Identify the hormone labelled **A**
b. Name the site of action of hormone **A**
c. Identify the feedback labelled **D**

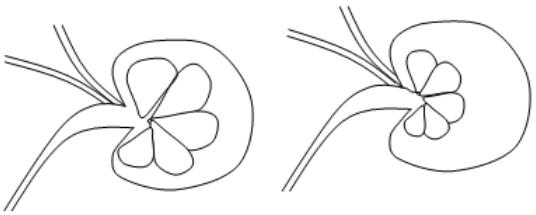
16. State **three** importance of Osmosis in plants
17. A patient was complaining of thirst most of the times. A sample of the patient's urine was found not to contain a lot of sugar but was dilute:-
    a. Name the hormone the person's body was deficient of
    b. Which gland produces the above hormone
    c. Name the disease that the patient was most likely suffering from
18. State **two** features in the nephron that facilitate ultra filtration
19. The table below shows a description of size of glomeruli and renal tubules of two animals which are adapted to living in different environment:-

	Animal A	**Animal B**
Glomeruli	large and few	small and many
Renal tubules	short	long

a. Name the likely environment in which animal **A** lives.
b. Suggest the main nitrogenous waste produced by animal **B.**
c. Name the organelle of osmoregulation in each of the following animal: i) Paramecium
    i. ii) Insects

20. What role is played by the liver in excretion?
21. Explain the effects of the following on the quantity and composition of urine
    a. Drinking large amount of clean water
    b. Drinking very salty soup
    c. Removal of pancreas
22. (a) Distinguish between **excretion** and **egestion**
    (b) State the importance of excretion in the bodies of living organisms.

23. The diagram below shows simplified structures of kidneys from two different animals.

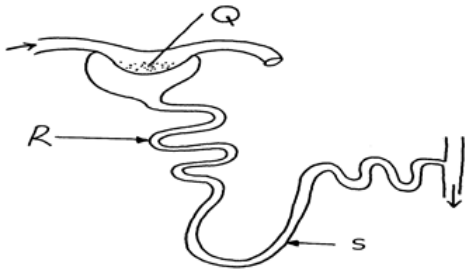


Animal **N** Animal **M**

a. Suggest possible habitat in which animal **N** is found.
b. Give **two** reasons for your answer in (a) above.

24. (a) What is poikilotherm?
(b) State **two** classes of phylum chordata where all members are poikilothermic.

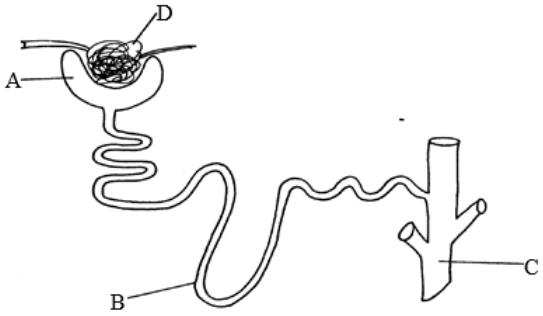
25. The diagram below represents a mammalian nephron



(i) Name the structure labelled **Q** .....

(ii) State **two** adaptations of part labeled **R**

26. The diagram below represents a nephron of a mammal:



a. Name the parts labeled **A, B** and **D**
b. Name a major substance in glomerular filtrate whose concentration remains the same between **A** and **C**

27. The equation below represents a metabolic process that occurs in a certain organ in the mammalian body: -

$$\text{Ammonia} \xrightarrow[\text{Carbon (IV) oxide}]{\text{Enzymes}} \text{Organic compound } \mathbf{Q} + \text{water}$$

a. Name the process represented in the equation.
b. Name the organ in which the process occurs.
c. Why is the process important to the mammal?
d. Identify the organic compound **Q.**
e. Explain the source of ammonia in the organ named in **(b)** above.
f. What happens to organic compound **Q**?

28. The table below shows the percentage of some substances in the glomerular filtrate and urine of a certain mammal: -

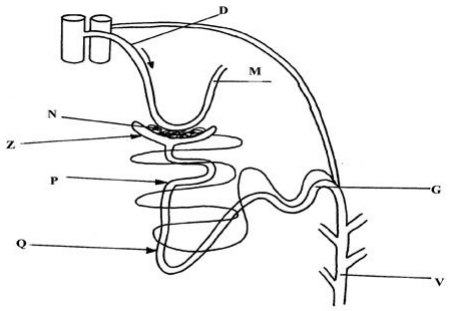
Substances	Contents in glomerular filtrate	Contents in urine
Water	90	90
Sodium ions	0.3	0.35
Chloride ions	0.37	0.60
Glucose	0.1	0.0
Urea	0.03	2.0
Proteins	0.0	0.0

a. From the above table, account for;
   (i) The absence of glucose in urine
   (ii) The absence of protein in both glomerular filtrate and urine

b. Explain the significance of the flow system in the nephron where the glomerular filtrate flows in opposite direction to that of blood in the surrounding capillaries
c. Name the hormone that controls the percentage of water in urine and that which control the amount of salts.

d. List any **two** diseases /disorders of the kidney

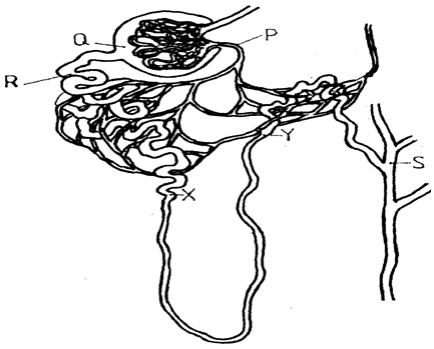
29. Study the diagram below and answer the questions that follow.



a. Name the structure represented by the diagram
b. Name the parts labelled **D** and **M**

b. Name the hormones whose sites of action are Q and G
c. Name **one** substance that is present in part **N** but absent in part **Z**
d. The contents of part **V** were boiled with Benedict's solution and an orange precipitate was formed. Account for the results

30. How does an Endotherm respond to both heat gain and heat loss?
31. The diagram below represents a mammalian nephron.



a. Name the: (i) Structure labelled **P**

b. State the structural modifications of the part label led **Q** for
   (i) Desert mammals
   (ii) Fresh water mammals

c. (i) Name **one** substance present at point **R** but absent at point **S** in a healthy mammal.
   (ii) The appearance of the substance you have named in **(c)(i)** above is a symptom of a certain disease. Name the disease

32. Describe how the mammalian skin regulates body temperature