

553/1
BIOLOGY (Theory)
S.4
Paper1
Apr/May 2023
2½ hours

Name;

.....

Reg No;

.....

ST NOA GIRLS SS ZANA

Uganda Certificate of Education
BIOLOGY (THEORY)
Paper1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

This paper consists of sections A, B and C.

Answer all questions in sections A and B, plus two questions in Section C.

Write the answers to section A in the boxes provided, answers to section B in the spaces provided, and answers to section C in the answer booklets/ sheets provided.

FOR EXAMINERS' USE ONLY		
Section	Marks	Examiner's Signature & No.
A:		
B: No.31		
No.32		
No.33		
C: No.		
No.		
Total		

SECTION A (30 MARKS)

1. In plants, anaerobic respiration is less efficient than aerobic respiration because during anaerobic respiration

A. not all the carbohydrates are broken down.
 B. the amount of carbon dioxide released is less than in aerobic respiration.
 C. there is less energy released per unit weight of carbohydrates broken down.
 D. less water is produced in anaerobic respiration.

☐

2. In which part of the cell does anaerobic respiration occur?

A: mitochondrion B: vacuole C: cytoplasm D: nucleus

☐

3. Which one of the following forms part of the insect respiratory system?

A. Trachea, tracheoles and bronchioles.
 B. Spiracle, trachea and tracheoles.
 C. Spiracles, trachea and bronchioles.
 D. Trachea, bronchus and bronchioles.

☐

4. Which one of the following is the source, target and effect of insulin on the human body?

	Source	Target	Effects
A	Liver	Liver	Decrease amount of glucose in blood
B	Pancreas	Pancreas	Increase amount of glucose in blood
C	Liver	Pancreas	Decrease amount of glucose in blood
D	Pancreas	Liver	Decrease amount of glucose in blood

☐

5. The role of phloem in plant stem is to;

A. Transportation of food substance from leaves to other parts of the plant
 B. Transportation of water and mineral salts from leaves to other parts of the plant
 C. Transportation of food and mineral salts from leaves to other parts of the plant
 D. Transportation of mineral salts and water from roots to other parts of the plant

☐

6. Which one of the following is an example of a tactic response?

A. Rolling up of leaves on a sunny day.
 B. Withdrawal by blowfly larvae from light.
 C. Withdrawal of the hand from a hot object.
 D. Bending of a plant towards light.

☐

7. Osmosis is inhibited in?

A. Dilute solutions separated by partially permeable membranes
 B. Concentrated solution separated by partially permeable membranes
 C. Living tissues
 D. Killed tissues

☐

8. Which of the following organisms relies on a hydrostatic skeleton? ☐
- A. Grass hopper B. Earth worm C. Crab D. Millipede
9. Which of the following food substances is the main source of energy in the body? ☐
- A. Proteins B. Glucose C. Fats D. Vitamins
10. Which of the food stuffs provides energy during starvation? ☐
- A. Carbohydrates and proteins C. Lipids and proteins
B. Carbohydrates and lipids D. Carbohydrates and vitamins
11. When cut cubes of *Solanum tuberosum* are dropped into a container of hydrogen peroxide solution, there is an evolution of gas around the cubes. This is because the ☐
- A. enzyme in the potato releases oxygen from the hydrogen peroxide
B. cube cells become plasmolyzed by hydrogen peroxide
C. rate of potato cell respiration has been increased by hydrogen peroxide
D. hydrogen peroxide displaces the air between the cell
10. The main value of sweating in man is that during the process ☐
- A. Excess water is removed from the body
B. Latent heat of vaporization of water helps to cool the body
C. Excess mineral salts are removed from the body
D. The body gets rid of excess nitrogenous wastes
11. *Mimosa pudica* exhibits which type of nastic response? ☐
- A. Photonasty B. Hydronasty C. Haptonasty D. Thermonasty
12. In which part of the nephron does ultrafiltration take place? ☐
- A. Renal tubule B. Collecting tubule C. Glomerulus D. Renal vein
13. A rabbit is able to utilize cellulose because it ☐
- A. has symbiotic bacteria in the stomach
B. has symbiotic bacteria in the caecum
C. has a very long alimentary canal
D. secretes the enzyme cellulase
14. In peas, yellow seed color is dominant over green seed color. What would be the phenotype of the off spring if a true breeding yellow-seeded plant is crossed with a green -seeded plant? ☐
- A. 2 yellow : 2 green C. 3 green: 1 yellow
B. 3 yellow: 1 green D. All yellow
15. In a photometer, the rate of movement of an air bubble corresponds to the rate of ☐
- A. Water uptake C. Air movement around the plant
B. Osmosis D. Water loss from the reservoir

17. The data below shows the amount of carbon dioxide in inhaled air, rate of breathing at rest and volume of air in a breath in humans:

Percentage of carbon dioxide to inhaled air = 0.025%

Number of breaths per minute = 36

Volume of one breath taken in at rest = 500cm³

The volume of carbon dioxide inhaled per minute while at rest is

A. 0.9 cm³

C. 12.5 cm³

B. 45 cm³

D. 450 cm³

12. In the body temperature regulation, vasodilatation

A. Allows more blood to enter the skin capillary network

B. Allows more urine to be secreted into the bladder

C. Allows less sweat to be secreted by sweat glands

D. Decreases heat loss by radiation

13. In which part of the kidney nephron does reabsorption of glucose occur?

A. Proximal convoluted tubule.

C. Descending loop of Henle.

B. Distal convoluted tubule.

D. Ascending loop of Henle.

14. The following is a dichotomous key of invertebrates:

(1)(a) Has 8 legs..... W

(b) Has 6 legs..... 2

(2) (a) Has long antennae..... X

(b) Has short antennae..... 3

(3) (a) Has proboscis..... Y

(b) Has mandibles..... Z

Which one of the organisms is a fly?

A.W

B.X

C.Y

D. Z

15. Which one of the following substances accumulates in muscles during vigorous exercise?

A: water

B: lactic acid

C: carbon dioxide

D: oxygen

16. The gas likely to be evolved from a submerged aquatic plant placed in bright sunlight is

A. carbon dioxide

B. Oxygen

C. Hydrogen

D. Nitrogen

17. Enzymes are said to be specific in nature because they are

A: proteins

B: act in a particular pH medium

C: act on one kind of substrate

D: remain unchanged at the end of the reaction

18. In the body temperature regulation, vasodilatation

- A. Allows more blood to enter the skin capillary network
- B. Allows more urine to be secreted into the bladder
- C. Allows less sweat to be secreted by sweat glands
- D. Decreases heat loss by radiation.

☐

19. Which one of the following is characteristic of monocotyledons?

- A: leaf sheath
- B: net venation
- C: prominent taproot
- D: cork layer.

☐

20. Green plants produce less carbon dioxide during the day because:

- A. Most stomata close during strong light and heat
- B. Transpiration interfere with carbon dioxide evolution
- C. The rate of transpiration is low during the day
- D. Some of the carbon dioxide is used by photosynthesis

☐

21. Lack of nucleus in the red blood cells is an advantage in that it;

- A. Enables the cell to pass through capillaries
- B. Allows the cell to carry a lot of oxygen
- C. Allows the cell to carry a lot of food
- D. Enables the cell to engulf germs easily

☐

22. Which of the following is the best way a swamp could be better utilized?

- A. Reclaiming to establish dairy farms
- B. Carry out fish farming and for raw materials
- C. Planting eucalyptus to prevent flooding
- D. Growing yams and rice to combat famine

☐

23. Which of the mammals below is most likely to be a carnivore of desert area?

Animal	Conc. of urea	Relative length of intestines	Period of greatest activity
A	High	Long	Night
B	High	Short	Night
C	High	Short	Day
D	Low	Short	Night

☐

24. When a white flowered plant is crossed with red flowered plant, pink flowered plants are produced. Which of the following would be the phenotypic ratio of the F₂ when the off springs are selected?

- A. 1 red: 1 pink: 2 white
- B. 1 red: 2 pink: 1 white
- C. 1 red: 1 pink: 1 white
- D. 2 red: 1 pink: 1 white

☐

25. Below is a food chain

Algae → mosquito larvae → small fish → large fish → crocodile

Which of the following would help in the reduction in the number of mosquito larvae?

- A. Increased in the number of algae
- B. Increase in the number of large fish
- C. Increase in the number of crocodiles
- D. Decrease in the number of small fish.

☐

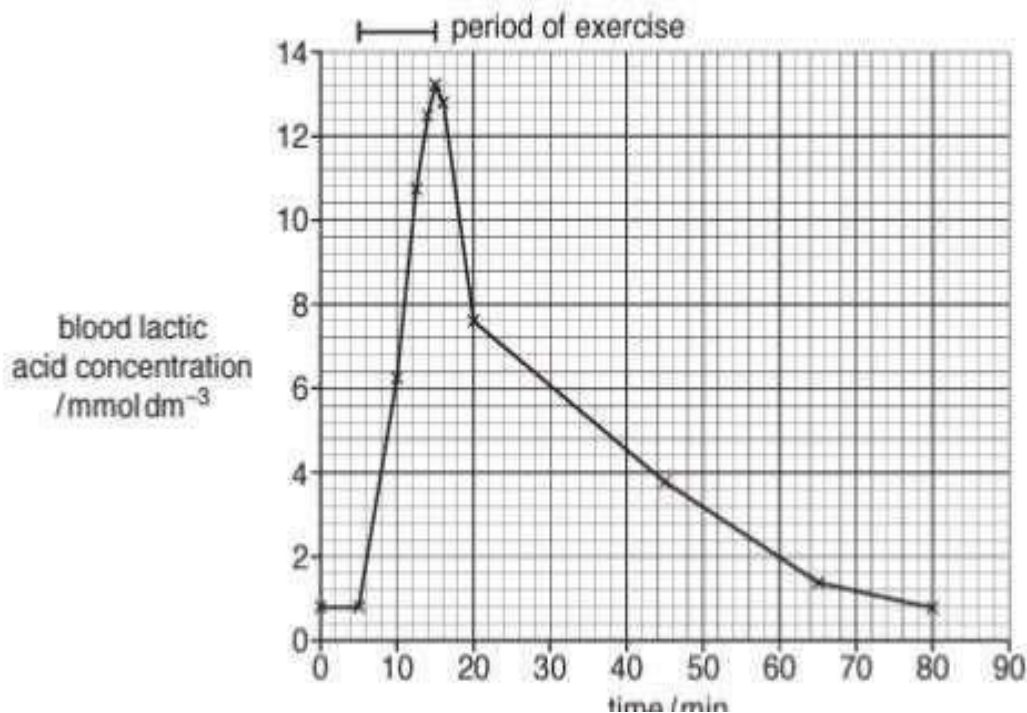
26. Which one of the following digestive processes is catalyzed by salivary amylase?

- A. Maltose to glucose
- B. Sucrose to glucose and fructose
- C. Starch to maltose
- D. Lactose to galactose and glucose

☐

SECTION B (40 MARKS)

27. Graph in figure below shows results of blood lactic acid concentration obtained from a fitness trainee's finger before, during and after vigorous exercise. Study it carefully and answer the following questions.



- a. Describe the changes in blood lactic acid concentration before, during and after exercise. (5 marks)

.....

.....

.....

.....

.....

.....

b. Explain the changes in the concentration of lactic acid between

i. From 0 minutes to 6 minutes.(4 marks)

.....

.....

.....

.....

.....

ii. From 6 minutes to 17 minutes. (3 marks)

.....

.....

.....

.....

iii. From 17 minutes to 80 minutes. (2 marks)

.....

.....

.....

.....

.....

c. What are the effects of lactic acid to the human body? (2 marks)

.....

.....

d. What is difference between anaerobic and aerobic respiration. (2 marks)

.....

.....

.....

.....

.....

e. State the functions of ATP in the human body.

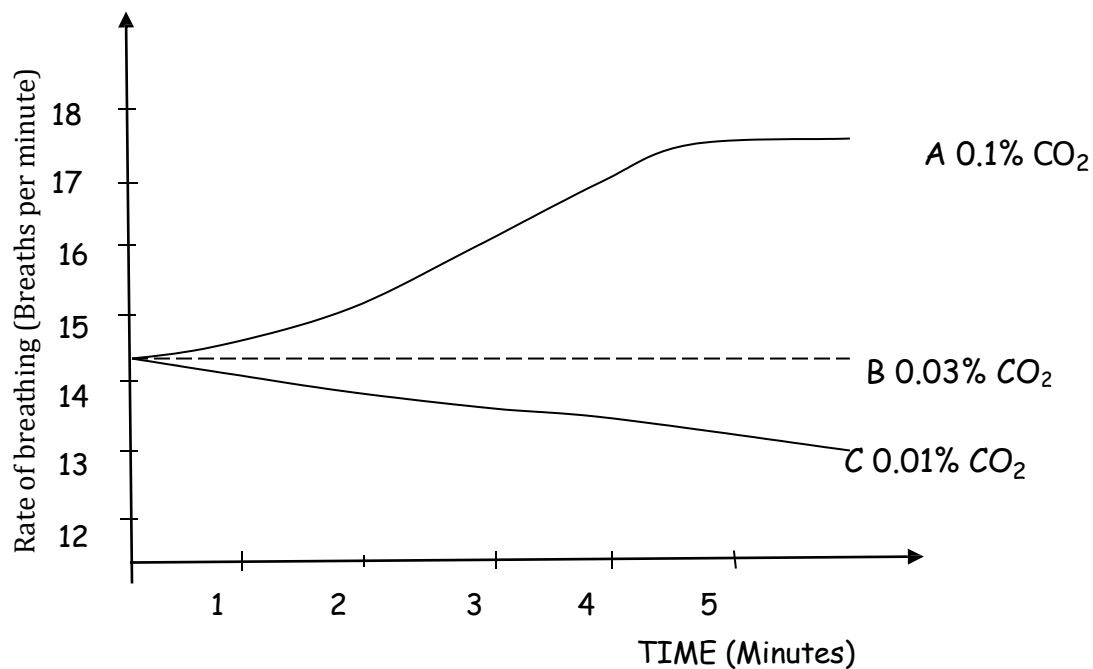
(2 marks)

.....

.....

.....

32. An experiment was carried out to find the effect of changing the concentration of carbon dioxide in the air on the rate of breathing. The results are shown below.



(a) (i) What is the rate of breathing when the person has been breathing 0.1% carbon dioxide for 3 minutes? (01 mark)

.....

.....

(ii) With a letter label the curve which represents the amount of carbon dioxide normally present in air? (01 mark)

(iii) What is the effect of decreasing the carbon dioxide concentration on the rate of breathing? (01mark)

.....

.....

(iv) Some people think that the success of the mouth method of reviving an unconscious person is due to the amount of carbon dioxide forced into the victim's lungs.

(a) How does the graph support this view? (02 marks)

.....

.....

.....

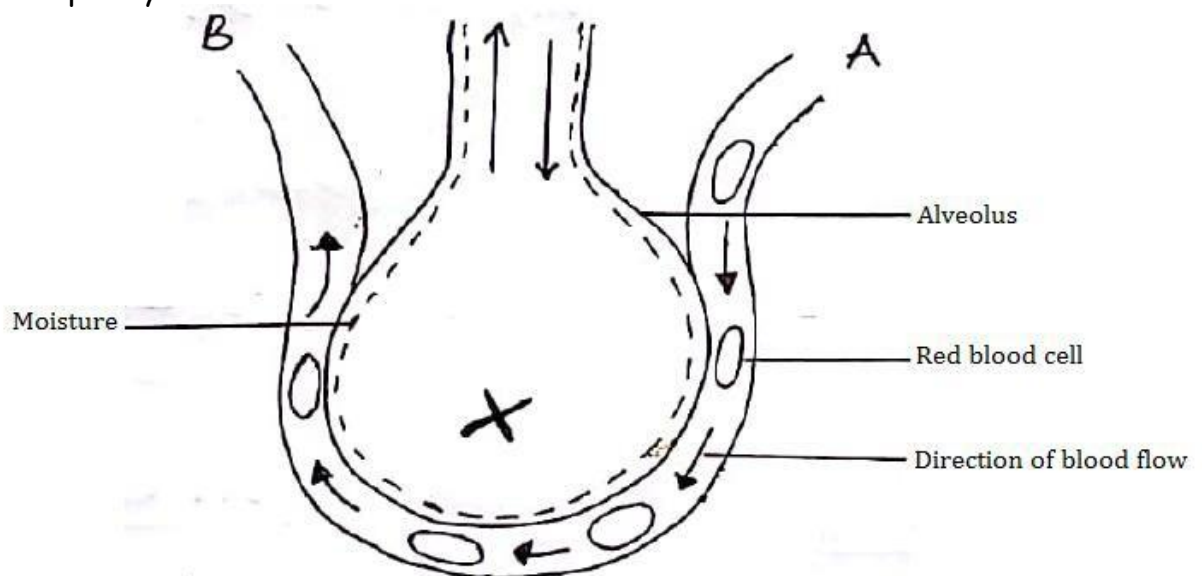
(b) There is an increase in the rate of oxygen taken into the lungs during exercise. Use the graph to explain why. (02 marks)

.....

.....

.....

(c) The diagram below shows a section through an alveolus and a surrounding blood capillary.



(i) Why do the walls of the alveoli have elastic properties? (02 marks)

.....

.....

(ii) Give one difference between the composition of blood that enters the alveolus at A and that which leaves it at B. (01 mark)

.....

33a In an ecosystem, there are the following organism; hawks, snakes, toads, lizards, worms, termites, grasshoppers, and grass.

i. Construct a food web to represent all the organisms. (4marks)

ii. Construct a pyramid of number of organisms in the food chain above. (3 marks)

(c) Identify the trophic level occupied by the following organism in the ecosystem.

(i) Toad (1 mark)

(ii) Termite (1 mark)

(iii) Grass (1 mark)

SECTION C (30 MARKS)

Choose any **two** questions

34(a) Distinguish between Excretion and Osmoregulation. (2 marks)

b. Give reasons why plants do not require special excretory organs as Man. (4 marks)

c. Describe how water balance is maintained in Man. (9 marks)

35(a) Giving any two regions where they are found in plants, what are auxins? (3 marks)

(b). Describe the effect of Auxins on each of the plant parts you have mentioned in (a) above. (10 marks)

(c). Other than Auxins, state other four substances having a similar effect to the plant's physiology. (2 marks)

36 (a) What is photosynthesis? (2 marks)

b. State 4 factors that affect the rate of photosynthesis. (2 marks)

c. In what various ways are leaves adapted to their function? (4 marks)

d. Describe an experiment to show that oxygen is given off during photosynthesis. (7 marks)

37(a) (i) Differentiate between continuous and discontinuous variations. (2 marks)

(ii) Give two examples of characters which exhibit continuous variation and discontinuous variation. (3 marks)

b. A plant with yellow leaves was crossed with a plant with green leaves. The gene for yellow leaves is recessive to that of green leaves. Using genetic symbols

(i) Show the possible genotypes and phenotypes of the F₁ offspring. (5 marks)

(ii) What is the genetic ratio if F₁ is selfed? Show your working State the phenotypic and genotypic ratios of F₂. (5 marks)

END