

Name: .....  
Centre/Index Number: ..... Signature: .....

553/1  
BIOLOGY  
Paper 1  
July/August 2023  
2½ hours



**MASAKA DIOCESAN EXAMINATIONS BOARD**  
**Uganda Certificate of Education**  
**Joint Mock Examinations 2023**  
**BIOLOGY**  
**(THEORY)**  
**Paper 1**  
**2 hours 30 minutes**

**INSTRUCTIONS TO CANDIDATES:**

*Answer **all** questions in section A and B plus two questions in section C.*  
*Write **all** the answers to section A in the boxes provided and answers for section B in the spaces provided and answers for section C on the answer sheet provided.*

<i>For Examiner's Use Only</i>		
Section	Marks	Examiner's Signature
A:		
B: No. 31		
No. 32		
No. 33		
C: No.		
No.		
Total		

**SECTION A: (30 marks)**

*Choose the best answer and write its letter in the box provided.*

1. Which of the following is true about insect and not arachnida?  
A. Three main body regions.  
B. Jointed appendages.  
C. Exoskeleton.  
D. Hairy bodies.  

☐
  
2. Sweet potato (*ipomea batatas*) tuber is a modification of;  
A. primary root.  
B. fibrous root.  
C. underground root.  
D. adventitious root.  

☐
  
3. Which one of the following taxonomic groups of organisms interbreed to produce fertile off springs?  
A. Genus.  
B. Species.  
C. Family.  
D. Order.  

☐
  
4. When a homoiotherm moves from a warmer to a colder environment, the following can occur except;  
A. the body hair falls.  
B. skin blood capillaries become constricted.  
C. erector pilli of the muscles contract.  
D. its metabolic rate increases.  

☐
  
5. Which one of the following human disease is caused by deficiency of a hormone?  
A. Beriberi.  
B. Diabetes.  
C. Anaemia.  
D. Scurvy.  

☐

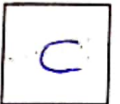
6. Which of the following supplies blood to the liver? It is hepatic;

- A. vein only.
- B. vein and hepatic portal vein.
- C. artery and hepatic portal vein.
- D. artery and hepatic vein.



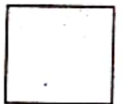
7. Which of the following is the most unreliable method of birth control?

- A. Condom.
- B. The pill.
- C. Rhythm.
- D. Vasectomy.



8. A woman of blood group O married a man of blood group B and they produced a child of blood group O. Which one of the following is **true** about this family?

- A. a man was heterozygous for blood group B.
- B. a man was homozygous for blood group B.
- C. a woman was heterozygous.
- D. the gene for blood group B is recessive.



9. Which of the following parts of the light microscope gives the initial magnification of a specimen?

- A. Objective lens.
- B. Mirror.
- C. Turret.
- D. Eye piece.



10. Paramecium can reproduce by binary fission. Imagine that when it is put into a pond with conducive conditions, it reproduces twice and matures the same day. How many paramecia would be in the pond at the end of the fourth day?

- A. 64
- B. 12
- C. 256
- D. 126



11. Which of the following structures of a neurone speeds up transmission of the impulses?

- A. Nucleus.
- B. Myelin sheath.
- C. Dendrites.
- D. Schwann cell.

☐

12. The rate of heat loss from a small animal is relatively fast because;

- A. their small bodies produce less heat.
- B. they are covered with fur.
- C. their surface area/volume ratio is small.
- D. their surface area/volume ratio is large.

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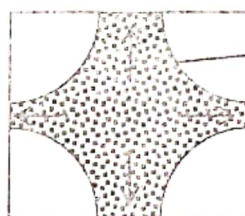
13. Which one of the following diets would be recommended for an overweight person?

- A. Low carbohydrates, high protein, low fat.
- B. High carbohydrates, low protein, low fat.
- C. High carbohydrates, high protein, low fat.
- D. Low carbohydrates, low protein, high fat.

☐

14. Figure 1 shows a cell. This cell is;

- A. Turgid
- B. Flaccid
- C. Swollen
- D. Plasmolysed



Membrane

Figure 1

☐

15. In an experiment to determine the percentage of air in a sample of soil, the initial volume of water in the measuring cylinder was  $215\text{cm}^3$  but when soil was added, it came to  $260\text{cm}^3$  and after stirring the volume settled at  $250\text{cm}^3$ . What was the percentage of air in the soil?

- A. 10
- B. 22
- C. 15
- D. 45

☐



16. Which of the following sets are invertebrates?

- A. Worms, fish, echinoderm, molluscs.
- B. Protozoa, hydra, round worms, arthropods.
- C. Molluscs, arthropods, lizards, worms.
- D. Reptiles, birds, mammals, fish.

☐

17. The plants in a quadrat were counted 200 black jacks, 100 wild finger millet, 296 couch grass, 4 sedges, 200 star grass what is the percentage of sedge?

- A. 0.5%
- B. 5%
- C. 2%
- D. 98%

☐

18. Which one of the following statements is true?

- A. Shoots are positively geotropic.
- B. Shoots are negatively geotropic.
- C. Roots are negatively geotropic.
- D. Roots are positively phototropic.

☐

19. Which of the following is the best important function of humus in the soil?

- A. Prevention of soil erosion.
- B. Increasing soil fertility.
- C. Water retention.
- D. Improving soil aeration.

☐

20. Insectivorous plants are found where soil lacks.

- A. phosphorous.
- B. nitrates.
- C. calcium.
- D. magnesium.

☐

21. Enzymes are said to be specific in nature because they;

- A. are proteins.
- B. work in a particular pH medium.
- C. remain unchanged at the end of the reaction.
- D. work on one kind of substrate.

☐

22. Which of the following statements gives the correct composition of a seed?

- A. Embryo, seedcoat, aleurone layer.
- B. Embryo, stored food, cotyledons.
- C. Embryo, stored food, aleurone layer.
- D. Embryo, seed coat, stored food.

☐

23. Which of the following pair of vessels would have the highest concentration of sugars?

- A. Xylem and hepatic vein.
- B. Phloem and hepatic vein.
- C. Xylem and hepatic portal vein.
- D. Phloem and hepatic portal vein.

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24. What is the main function of the contractile vacuole in amoeba? It is the removal of;

- A. Carbon dioxide.
- B. Excess water.
- C. Undigested food particles.
- D. Urea.

☐

25. Which of the following pairs of parts of a flower is essential for reproduction?

- A. Ovule and placenta.
- B. Style and sepal.
- C. Corolla and stigma.
- D. Carpel and stamen.

☐

26. A vertebra with a short neural spine and long transverse processes is a;

- A. lumbar vertebra.
- B. thoracic vertebra.
- C. cervical vertebra.
- D. sacral vertebra.

☐

27. Which one of the following structures of a bony fish enables it to vary its density while swimming?

- A. Lateral fin.
- B. Dorsal fin.
- C. Pectoral fin.
- D. Swim bladder.

☐

28. Which one of the following happens when the osmotic pressure of blood is higher than normal?

- A. Less ADH is secreted and more water is reabsorbed.
- B. Less ADH is secreted and less water is reabsorbed.
- C. More ADH is secreted and more water is reabsorbed
- D. More ADH is secreted and less water is reabsorbed.

☐

29. Which of one of the following is an example of a monoecious plant?

- A. Maize.
- B. Pawpaw.
- C. Pineapple.
- D. Bean.

☐

30. Which one of the following is not a major function of Auxins. They;

- A. inhibit cell elongation in roots.
- B. stimulate fruit growth and ripening.
- C. stimulate growth of adventitious roots.
- D. stimulate growth of internodes.

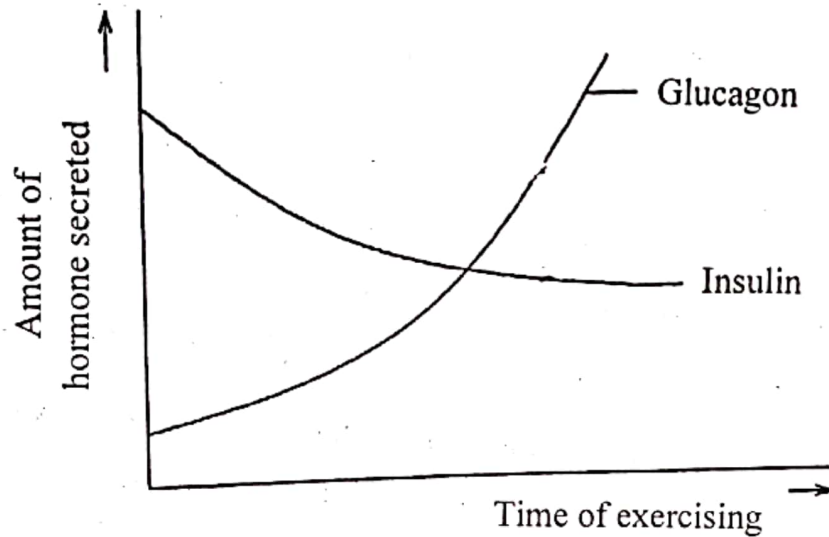
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**SECTION B: (40 marks)**

*Write the answers in the spaces provided.*

31. Figure 2 is a graph showing the effect of a prolonged exercise on the secretion of insulin and glucagon hormones in man.

**Figure 2**



- (a) Explain the variations in insulin and glucagon during the exercise.

i) Insulin

(05 marks)

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ii) Glucagon

(05 marks)

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(b) Suggest how the concentration of the two hormones would vary if the individual swallowed much glucose after the exercise.

i) Insulin

(03 marks)

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iii) Glucagon

(03 marks)

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- (c) Explain why it is important for the human body to secrete the insulin and glucagon hormones. (04 marks)

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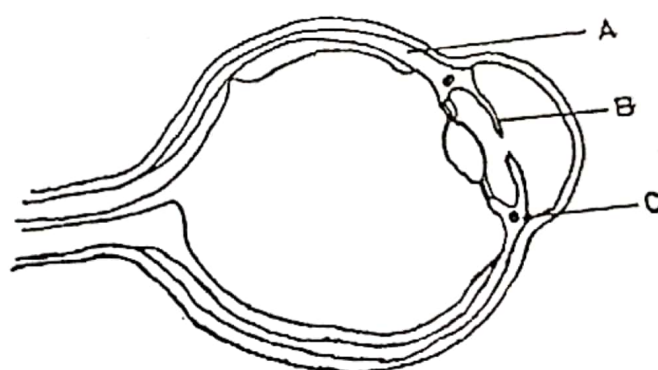
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32. Figure 3 represents a section through a mammalian eye.

**Figure 3**



- (a) Give two functions of structure A to the eye. (02 marks)

i) .....

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ii) .....

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- (b) i) What stimulus does structure B respond to? (01 mark)

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ii) How does structure B respond to the stimulus stated in b(i)?  
(03 marks)

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(c) How is part C involved in the change of focus of the eye from a distant object to a near object?  
(04 marks)

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33. The table below shows three different food chains A, B and C.

Table

	FOOD CHAINS		
	A	B	C
Primary producers	200 plant leaves	20 water weeds	5 cabbages
Primary consumers	100 caterpillars	200 insects	100 caterpillars
Secondary consumers	5 insectivorous birds	5 small fish	5 insectivorous birds
Tertiary consumers	1 carnivorous bird	1 large fish	500 fleas



- (a) Draw a pyramid of numbers for the food chains A and one of B or C. (04 marks)

- (b) Draw the expected pyramid of biomass for food chain B. (02 marks)

- (c) Describe the differences that are observed between the pyramids of numbers and the pyramid of biomass. (02 marks)

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- (d) List four abiotic factors that affect the distribution of organisms in a habitat. (02 marks)

- i) .....
- ii) .....
- iii) .....
- iv) .....

### SECTION C: (30 marks)

*Answer two questions from this section.*

34. (a) Outline the structural adaptations of an efficient respiratory surface in plants. (05 marks)
- (b) Describe the process of inhalation and exhalation in insects. (10 marks)
35. Describe how to determine the percentage of air in a soil sample. (15 marks)
36. (a) Why is the circulation of blood important in mammals? (06 marks)
- (b) Explain why plants are able to survive without a circulatory system. (09 marks)
37. (a) i) What is the importance of bile in digestion? (02 marks)
- ii) How does the body deal with amino acids? (07 marks)
- (b) Describe food digestion in the ileum of man. (06 marks)

**END.**