

Candidate's Name:

Signature:

Random No Personal No					

(Do not write your School/ Center Name or Number anywhere on this booklet)

P530/1

BIOLOGY
(Theory)
Paper 1

July./ Aug.2023

2½ hours



MMM JOINT MOCK EXAMINATION BOARD
Uganda Advanced Certificate of Education

BIOLOGY
(THEORY)

Paper 1

2hours 30minutes

INSTRUCTIONS TO CANDIDATES:

This paper consists of section; A and B

Answer all questions in both sections

Write answers to section A in the boxes provided and answers to section B in the spaces provided.

No additional sheets of paper should be inserted in this booklet.

For Examiners' Use Only			
Section	Question	Marks	Examiners' Signature and No.
A	1- 40		
B	41		
	42		
	43		
	44		
	45		
	46		
Total			

SECTION A (40 MARKS)

Write the letter corresponding to the right answer in the box provided. Each question in this section carries one mark.

1. Adaptations of plants to obtain nitrogen includes all the following except:

- A. being insectivorous.
- B. possession of aerial roots.
- C. presence of bacteria in root nodules.
- D. association with mycorrhiza on plant roots.

2. Net primary productivity in C₄ plants is higher than that in C₃ plants because:

- A. C₄ plants have a higher turn-over rate
- B. Photophosphorylation occurs in C₃ plants
- C. The rate of respiration is high in C₃ plants
- D. Energy accumulates at higher rate in C₄ plants.

3. All autotrophic bacteria

- A. use hydrogen sulphide as their raw material
- B. obtain hydrogen from sources other than water
- C. trap energy using bacterial chlorophyll
- D. use carbon dioxide as their raw material.

4. Both glucose and fructose have the same molecular formula C₆H₁₂O₆ but some of their chemical properties differ because

- A. glucose has a straight chain whereas fructose has a ring structure.
- B. the positions of the OH groups on the sugar molecules are different
- C. fructose is a ketose while glucose is an aldose
- D. glucose has a ring structure while fructose has a straight chain

5. The following conditions show trisomy, EXCEPT:
- A. Klinefelter's syndrome.
 - B. Turner's syndrome.
 - C. Down's syndrome.
 - D. XXX female.
6. When the osmotic potential of red blood cells lowers, then their
- A. osmotic pressure increases
 - B. water potential decreases
 - C. osmotic influx of water decreases
 - D. rate of haemolysis is likely to reduce
7. Which one of the following pairs of substances constitute the matrix of hyaline cartilage?
- A. Chondrin and chondrocytes
 - B. chondrin and collagen fibres
 - C. Ground substance and elastic fibres
 - D. collagen and elastic fibres
8. Which of the following pairs of enzymes are involved in the final steps of respiration?
- A. Transferases and phosphokinases
 - B. Decarboxylases and oxidases
 - C. Isomerases and transaminases
 - D. Decarboxylases and dehydrases.
9. The following structures are found in the heart
- | | |
|-----------------------------|----------------------|
| (i) bundle of His | (ii) purkinje tissue |
| (iii) atrioventricular node | (iv) sinoatrio node |

Which of the following structures show the correct sequence of the impulse conduction through the heart?

- A. iii, iv, i, ii
- B. iii, iv, ii, & i
- C. iv, iii, ii & i
- D. iv, iii, i & ii

10. Even after maximum forced expiration, the lungs can not collapse because of the

- A. dead air space
- B. residual air
- C. tidal volume
- D. vital capacity

11. Enzymes are much more efficient than inorganic catalysts because

- A. inorganic catalysts are readily affected by temperature extremes
- B. enzymes are not used up in the reaction
- C. enzymes achieve the highest lowering of activation energy.
- D. enzymes can catalyze reversible reactions.

12. Secretion of the non-enzymatic component of pancreatic juice is triggered by the hormone

- A. secretin
- B. enterogastrone
- C. cholecystokinin
- D. gastrin

13. The major role of accessory pigments in a chloroplast is to
- A. allow maximum absorption of light of a particular wave length.
 - B. increase the range of wavelengths from which a plant obtains energy
 - C. maximize light absorption even at low light intensities
 - D. absorb light of wavelengths that is transmitted by other pigments.
14. The scheme in the figure below is an incomplete representation of a respiratory pathway.
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- Under what circumstances will the pathway X be blocked? When;
- A. there is accumulation of lactic acid
 - B. the cell's internal supply of NAD^+ is rapidly reduced.
 - C. oxygen is not available.
 - D. there is limited supply of glucose.
15. The product of the first meiotic division during spermatogenesis is
- A. Spermatid
 - B. Spermatogonia
 - C. primary spermatocyte
 - D. Secondary spermatocyte
16. Which one of the following is true about sex limited characteristics? They
- A. are controlled by genes located on X sex chromosomes.
 - B. are more common in males than in females.
 - C. are controlled by autosomal genes.
 - D. often threaten survival of the bearer.

17. During excretion in insects, which of the following enters the Malpighian tubule passively?

- A. K^+ and Na^+
- B. salts and water
- C. carbon dioxide and water
- D. uric acid and ammonia

18. Lateral inhibition in mammalian eye is attributed to;

- A. cones and amacrine cells
- B. horizontal and cone cells
- C. amacrine and horizontal cells
- D. cone and rods only.

19. In plant the primary meristem comprises;

- A. apical meristem, vascular cambium and cork cambium
- B. vascular cambium ,protoderm and procambium
- C. ground meristem, protoderm and procambium
- D. epidermis, apical meristem and vascular cambium

20. Which one of the following factors does not determine the height in a gliding bird?

- A. Metabolic rate
- B. Shape of the wing
- C. Increased size of the wing
- D. angle of attack

21. Which one of the following is not a pre-mating isolation mechanism?

- A. Seasonal isolation
- B. behavioral isolation
- C. habitat isolation
- D. hybrid sterility

22. During stress, conversion of glycogen into glucose is stimulated by;

- A. insulin
- B. glucagon
- C. thyroxine
- D. adrenaline

23. Which of the following can lead to genetic death in a population?

- A. sickle cell trait
- B. infertility in males
- C. hemophilia
- D. albinism

24. Which one of the following is NOT a biological function of courtship?

- A. Enables closely related species to distinguish each other
- B. Establishes pecking order between individuals
- C. Helps to ensure that the two animals involved are ready for mating
- D. Acts as a stimulus to operate internal control mechanism

25. During water stress in plants, photosynthesis reduces mainly due to shortage of;

- A. water
- B. carbon dioxide

- C. mineral salts
 - D. oxygen
26. An animal has a radial symmetry, a diploblastic body wall and a sac-like body with only one opening that is surrounded by tentacles. The animal is most likely to be
- A. an annelid
 - B. a mollusk
 - C. a cnidarian
 - D. a nematode
27. The gene for albinism is also responsible for light skin colour, pink eyes and brown hair. This is an illustration of;
- A. codominance
 - B. pleiotropy
 - C. epistasis
 - D. linkage
28. Which of the following pairs below show a synergistic interaction?
- A. Auxins and Gibberellins
 - B. Ethene and Cytokinin
 - C. Abscisic acid and Cytokinin
 - D. Ethene and Abscisic acid
29. The importance of a long refractory period in cardiac muscle is to protect it from
- A. over contracting
 - B. developing tetanus
 - C. developing an oxygen debt
 - D. pumping too much blood to the tissue

30. The position of an organism within a pecking order usually depends on the following except.

- A. size of the animal
- B. fitness of the animal
- C. genetic vigor of the animal
- D. aggressiveness

31. Which one of the following is a physiological adaptation of terrestrial plants to minimize water loss?

- A. Leaf orientation
- B. Folding of plant leaves
- C. Periodic shedding of leaves
- D. Change of stomata rhythm

32. A person's blood group is type B. This means that her (or his)

- A. blood plasma contains antigen B only
- B. blood plasma contains only anti body **a**
- C. red blood cells possess antibody **b** only
- D. red blood cells possess antigen A only

33. Given that the loci of a particular pair of linked autosomal genes are very close to each other. Which one of the following is the expected resultant phenotypic ratio of a cross between two double heterozygous parents?

- A. 1 : 1
- B. 3 : 1
- C. 1 : 1 : 1 : 1
- D. 9 : 3 : 3 : 1

34. Which one of the following would require complete blood transfusion to an infant whose blood cells have been destroyed?

- A. Father Rh⁻, Mother Rh⁻, Infant Rh⁻
- B. Father Rh⁺, Mother Rh⁻, Infant Rh⁺
- C. Father Rh⁺, Mother Rh⁺, Infant Rh⁻
- D. Father Rh⁺, Mother Rh⁺, Infant Rh⁺

35. Which one of the following influences the rate at which the mammal expends energy?

- A. Liver
- B. Hypothalamus
- C. Thyroid
- D. Adrenal cortex

36. The urine that flows out of the collecting duct has its osmotic concentration nearest to that of the

- A. cortex region
- B. medulla region
- C. distal convoluted tubule
- D. Proximal convoluted tubule

37. Which one of the following is most likely to lead to polymorphism in a population?

- A. Artificial selection
- B. Disruptive selection
- C. Stabilizing selection
- D. Direction selection

38. When using the capture mark recapture method, the following factors must be considered except:

- A. release of animals in their inactive period
- B. scatter points of release throughout the habitat
- C. do not release near any danger
- D. releasing process should not damage the organisms in any way.

39. Which one of the following is not an advantage gained from innate evolutionary behavior?

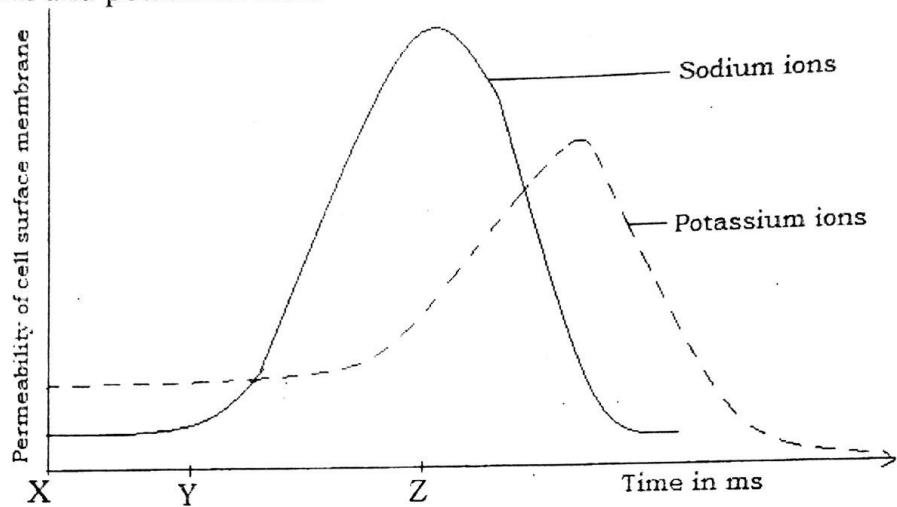
- A. Longevity of the organism
- B. Survivorship of the organism
- C. learning by the organism
- D. Biological fitness of the organism.

40. The biological role of a protein molecule depends on;

- A. its 3-dimensional shape
- B. the pattern of folding of the polypeptide chain
- C. the sequence of amino acids it contains
- D. other protein molecules with which it is associated.

SECTION B (60 MARKS)
Write answers in the spaces provided

41. The figure below shows the changes in permeability of the cell surface membrane of an axon to sodium and potassium ions.



- a) Explain the permeability of the cell surface membrane to
(i) sodium and potassium ions during the period X to Y. (02 marks)

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(ii) sodium ions during the period Y to Z. *(03 marks)*

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b) Describe three functions of a sensory system. *(03 marks)*

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c) What are the advantages of conduction of messages through a chemical synapse? *(02 marks)*

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42. The evolution of organisms from unicellular into multicellular came with both advantages and some challenges.
(a) Give the advantages of multicellular over unicellular state. (04 marks)

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- (b) State the challenges created due to evolution from unicellular to multicellular organization in animals. (03 marks)

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- (c) Explain how such challenges have been solved in higher animals, such as mammals. (03 marks)

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43. In ecology, lichens are described as symbiont pioneer indicator species.

- (a) Explain why lichens are referred to as indicator species (03 marks)

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(ii) symbionts

(03 marks)

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- (b) Lichens form a pioneer community of the primary ecological succession.
Explain its suitability for this.

(04marks)

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44. a) (i) Distinguish between positive feedback and negative feedback in homeostasis.

(02 marks)

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(ii) What are the features of an efficient homeostatic system? (02 marks)

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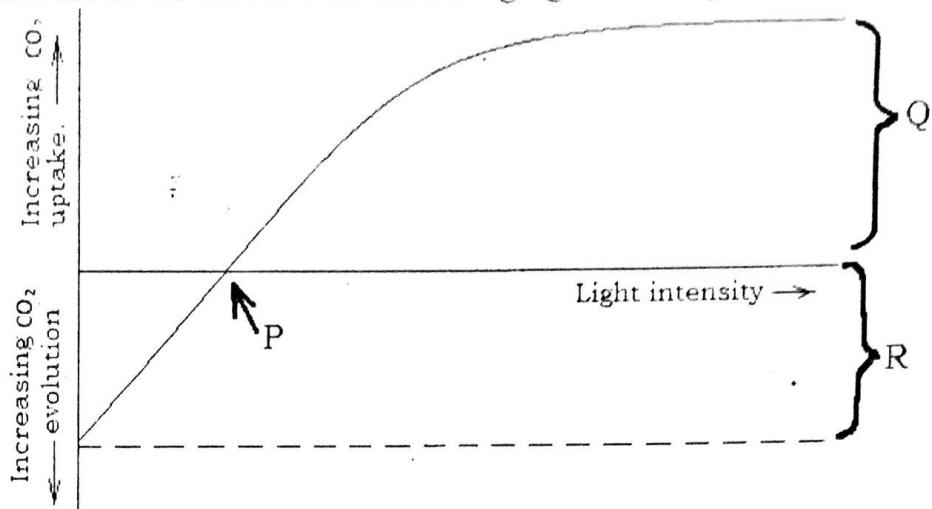
(b) (i) Describe the events that lead to the rise in the level of insulin in blood. (03 marks)

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(ii) What would be the effect of such rise in insulin level in an individual with an efficient homoeostatic system? (03 marks)

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45. The figure below is a graph showing the variation the amount of carbon dioxide that moves in and out of the leaves with increasing light intensity.



- (a) What is the physiological implication of the light intensity on the graph indicated by letters **R** and **Q**?

(i) region **R**

(02 marks)

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(ii) region **Q**

(02 marks)

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(b) (i) What does light intensity **P** on the graph indicate? *(01 mark)*

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(ii) Explain the adaptive significance of light intensity greater than **P** in photosynthesis to a flowering plant. *(03 marks)*

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c) State **two** physiological adaptation of sun plants to photosynthesis. *(02 marks)*

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46. (a) Describe the roles played by each of the following in muscle contraction. *(02 marks)*

(i) ATP

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(ii) Calcium ions *(03marks)*

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(b) How does the banding pattern change when the myofibril contracts?
(03 marks)

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(c) Describe **two** emergency stores of resources for muscle contraction.
(02 marks)

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END