Candidate's Name: .....

Signature: .....

Random No.					Personal No.		

P530/1
BIOLOGY
Paper 1
Jul./Aug. 2022
2½ hours

MASAKA DIOCESAN EXAMINATIONS BOARD

Uganda Advanced Certificate of Education
JOINT MOCK EXAMINATIONS 2022
BIOLOGY
(THEORY)
Paper 1
2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

This paper consists of sections **A** *and* **B**.
Answer **all** *questions in both sections.*
Section A: *Write answers to this section in the boxes provided.*
Section B: *Write answers to this section in the spaces provided.*
No additional sheets of paper should be inserted in this booklet.

For Examiners' Use Only		
Section	**Marks**	**Examiner's signature & No.**
A: 1 – 40		
B: 41		
42		
43		
44		
45		
46		
Total		

SECTION A *(40 MARKS)*

1. A zygote with three copies of chromosome 21 is known to manifest symptoms of

   A. Sickle cell anaemia
   B. Klinefelter's syndrome
   C. Turner's syndrome
   D. Down's syndrome

2. Which one of the following is the role of cholesterol in a plasma membrane?

   A. Reduces escape or entry of non-polar molecules
   B. Reduces escape or entry of polar molecules
   C. Reduces escape or entry of organic molecules
   D. Prevents drying up of the membrane.

3. Which of the following is an example of positive feedback?
   A. regulation of glucose
   B. end product inhibition
   C. secretion of oxytocin during labour
   D. regulation in concentration of thyroxine in blood

4. The phenotype resulting from a cross between pink eyed locusts and blue eyed locust depends on which locust is pink eyed. This means that the gene for eye colour is

   A. sex determined
   B. sex linked
   C. sex limited
   D. epistatic

5. Since the formation of sperms requires a temperature below the body temperature,

   A. the testes lie in scrotal sacs.
   B. more water intake is advised for mature males.
   C. scrotal sacs are pouch-like hanging extensions.
   D. scrotal sacs are between the thighs

6. Which one of the following leads to an influx of water in a freshwater teleost?

   A. Many, large glomeruli and salt reabsorption from the renal fluid
   B. Many, small glomeruli and salt extrusion from the body
   C. Few, large glomeruli and salt uptake

D. Many, small glomeruli and salt uptake

7. Why are certain exotic species considered "**invasive**"? They

A. are found in areas where they are not native.
B. were introduced by humans – often accidentally
C. spread aggressively and displace native species.
D. benefit from being in a new environment.

8. Which of the following changes in a cell is true as its water potential becomes **less negative**?

A. Decrease in turgor pressure
B. Decrease in osmotic potential
C. Increase in solute potential
D. Decrease in pressure potential

9. The major similarity between active transport and facilitated diffusion is that in both;

A. energy is used.
B. materials are transported against a concentration gradient
C. carrier proteins are involved.
D. movement of polar molecules is involved.

10. Which one of the following would be a result of increased carbon dioxide concentration in tissues?

A. Increase in affinity for oxygen by haemoglobin.
B. Increase in the loading tendency of haemoglobin.
C. Lowering of affinity for Oxygen by haemoglobin.
D. Shifting of the oxygen dissociation curve to the left.

11. Which one of the following justifies the statement that mutation is the ultimate source of variability?

A. DNA polymerase is remarkably accurate
B. "Mutation proposes and selection disposes"
C. Mutation is the only source of new alleles

D. Mutation occurs in response to natural selection

12. At what stage of cell division would the cell stop when colchicine is added?

A. Metaphase
B. Anaphase
C. Prophase
D. Telophase

13. When a lipid is combined with a phosphate group, it becomes

A. saturated
B. water soluble
C. amphipathic
D. amphoteric

14. Which one of the following has the greatest biomass?

A. primary consumers
B. secondary producers
C. primary producers
D. tertiary consumers

15. Which one of the following is the major role of T- helper cells in cell mediated response?

A. Stimulation of B cells to make antibodies.
B. Suppress activity of other T cells
C. Helps to kill body cells infected by viruses.
D. Gradually destroy transplanted organs

16. The respiratory pigment found in some arthropods is

A. haemoerythrin
B. haemoglobin
C. chlorocruorin
D. haemocyanin

17. Which one of the following determines the biological role of proteins?

A. Sequence of amino acids in them
B. Pattern of folding of the polypeptide chain

C. Other organic molecules with which it is associated
D. The specific three dimensional shape

18. To which kingdom do multicellular, nucleated heterotrophs that always obtain food by absorbing nutrients from the environment?

A. Plantae
B. Fungi
C. Monera
D. Animalia

19. In which part of the chloroplast are complex carbohydrates made?

A. Intermembrane space
B. Stroma
C. Inner membrane
D. Thylakoid

20. Which of the following polysaccharides contain amino acid group?

A. Murein
B. Cellulose
C. Chitin
D. Glycogen

21. Skin colour is an example of inheritance through

A. systematic genes
B. polygenes
C. sex linkage
D. multiple alleles

22. Which of the following is not a role of the larval stage in animal development?

A. Dispersion
B. Feeding
C. asexual reproduction
D. sexual reproduction

23. Which of the following occurs at the maximum ventricular pressure?

A. Semilunar valves close while atrioventricular valves open.
B. Both semilunar valves and atrioventricular valves open.

C. Both semilunar valves and atrioventricular valves close.
D. Semilunar valves open while atrioventricular valves close

24. A certain gene of a bacterium codes for a protein that is 40 amino acids long. How many nucleotides are needed to code for this polypeptide?

A. 40
B. 80
C. 120
D. 1600

25. In which of the following responses do auxins and gibberellins show synergism in their roles?

A. Fruit growth
B. Root growth
C. Apical dominance
D. Stomatal opening

26. The "**lub**" sound is produced after the;

A. ventricles are fully contracted.
B. bicuspid and tricuspid valves suddenly close.
C. semilunar valves are closed.
D. ventricles start to relax.

27. The association of white egrets with herds of cattle can be described as

A. Mutualism
B. Commensalism
C. Parasitism
D. Co-evolution

28. In which of the following processes is osmosis least involved?

A. long distance transport of xylem sap.
B. swelling of guard cells.
C. root pressure
D. water movement between neighbouring cells of the root cortex.

29. Which of the following blood proteins becomes the threads of a clot?

A. Prothrombin
B. Thromboplastin
C. Thrombin
D. Fibrinogen

30. Why does the absorption spectrum for chlorophyll and the action spectrum for photosynthesis coincide?

A. Photosystems I and II are activated by different wavelengths of light.
B. Wavelengths of light that are absorbed by chlorophyll trigger light-capturing reactions.
C. Energy from wavelengths absorbed by carotenoids is passed on to chlorophyll.
D. The rate of photosynthesis depends on the amount of light received.

31. Which one of the following is the significance of the radicle to emerge as a first step in germination?

A. Its hoot protects the shoot that emerges later.
B: It carries out photosynthesis to supply the embryo with food.
C. It establishes a supply of water to the growing embryo.
D. It is necessary to break the seed coat.

32. During an action potential in a neuron,

A. Potassium ions diffuse into the axon.
B. Sodium ions diffuse out of the axon.
C. Sodium ions diffuse into the axon.
D. Both the sodium and potassium ions diffuse into the axon.

33. Which one of the following would be the effect injecting thyroxine into a laboratory mammal?

A. Increase in oxygen consumption.
B. Decrease in metabolic rate.
C. Increase conversion of glucose into glycogen.

D. Thyroid gland becomes more active.

34. Production of hypertonic urine is mainly due to high levels of:

A. Aldosterone
B. Vasopressin
C. Adrenaline
D. Insulin

35. In which of the following areas is columnar epithelium with microvilli is most likely to be found?

A. Colon
B. Duodenum
C. Ileum
D. Stomach

36. Which of the following are reabsorbed in the Malpighian tubules during excretion in insects?

A. KHU, carbon dioxide and water
B. K^+ and Na^+
C. $KHCO_3$, water and carbon dioxide
D. KHU, water and $KHCO_3$

37. The streamlined shape of a shark, penguin and whale is an example of:

A. convergent evolution
B. parallel evolution
C. divergent evolution
D. co – evolution

38. Which of the following summarizes Mendel's law of segregation?

A. Pairs of factors are inherited independent of each other.
B. the two homologous chromosomes with a pair of genes and end up separately.
C. unlike chromosome pair separate at the spindle equatorial region.

D. adjacent genes on a chromosome are never found in the same gamete.

39. If the code for an amino acid is ATG on DNA molecule this code on the transfer RNA molecule is written as:

A. TAC
B. UAC
C. AUG
D. GUC

40. Which one of the following would take place after implantation of a zygote in the uterine wall of a human female?

A. Breakdown of the endometrium.
B. Development of ovarian follicles.
C. Continued development of the corpus luteum.
D. Increased secretion of luteinizing hormone.

SECTION B *(60 MARKS)*

41. a) What is meant by the term **alternation of generations**? (2 marks)

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b) What is the significance of alternation of generations in the life cycle of a plant? (4 marks)

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c) How are ferns better adapted in colonizing terrestrial habitats than mosses? (4 marks)

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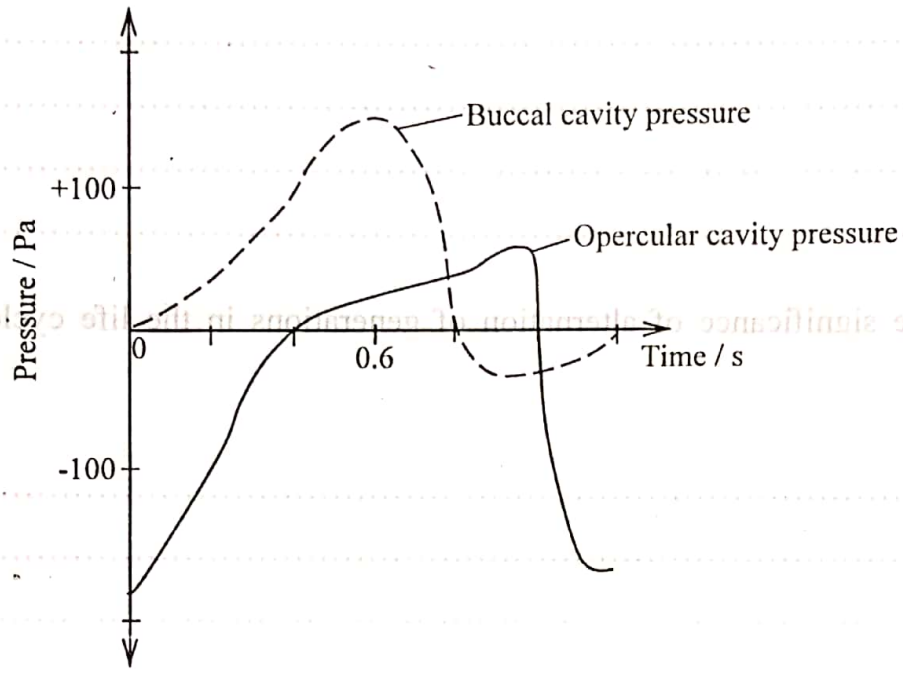
42. The figure below shows the changes in buccal cavity and opercular cavity pressure of a fish during a ventilation cycle.



a) Calculate the fish's ventilation rate in cycles per minute. (02 marks)

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b) Explain the piece of evidence from the graph which shows that water continuously flows in one direction over the gills?

(04 marks)

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c) How are the conditions for efficient gaseous exchange fulfilled in the mammalian lungs? (04 marks)

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43. a) Distinguish between **oestrus cycle** and **menstrual cycle.** (02 marks)

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b) State two roles of each of the following hormones in the control of the human menstrual cycle.

i) Follicle stimulating hormone

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ii) Oestrogen (02 marks)

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iii) Luteinizing hormone (02 marks)

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iv) Progesterone (02 marks)

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44. a) State the **principle of limiting factors.** (02 marks)

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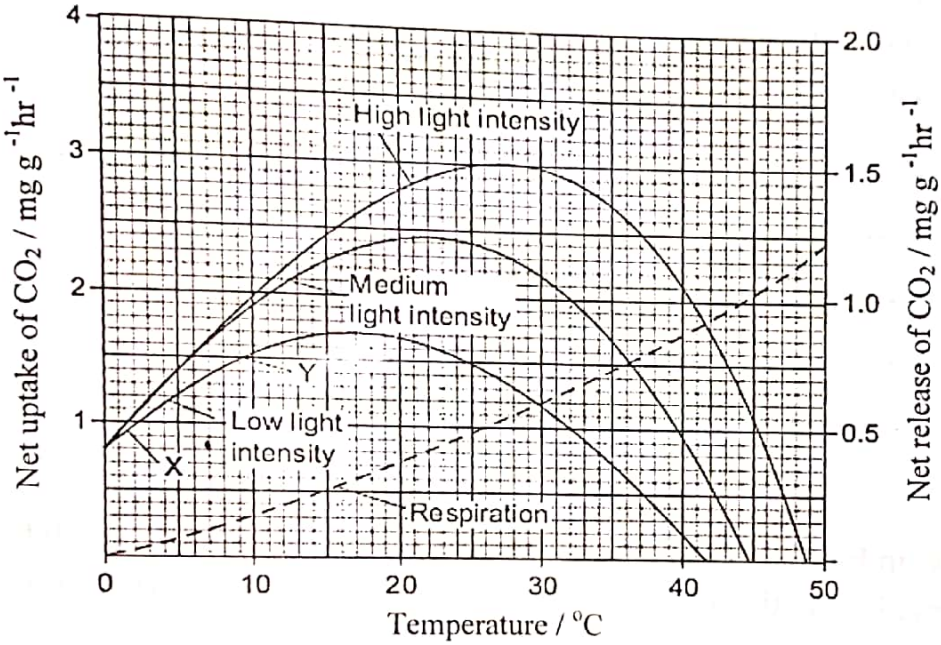
b) Scientists investigated the effects of temperature and light intensity on the rate of photosynthesis in ***Creeping azalea***. They investigated the effect of temperature on the net rate of photosynthesis at three different light intensities. They also investigated the effect of temperature on the rate of respiration. The graph shows the results.



i) Name the factors that limited the rate of photosynthesis between **X** and **Y**. (02 marks)

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ii) Use information from the graph to explain your answer. (02 marks)

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iii) From the graph, determine the gross rate of photosynthesis at 20°C and medium light intensity. (01 mark)

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c) ***Creeping azalea*** is a plant which grows on mountains. It is predicted that in the area where this plant grows, the mean temperature is likely to rise from 20°C to 23°C. It is also likely to become much cloudier. Describe and explain how these changes are likely to affect the respiration, photosynthesis and overall growth of *creeping azalea*. (03 marks)

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45. Lake Malawi in East Africa contains around 400 different species of **cichlids** which are small, brightly coloured fish. All these species have evolved from a common ancestor.

a) Describe **one** way in which you could find out whether **cichlids** from two different populations belong to the same species. (02 marks)

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b) During the last 700 000 years, there have been long periods when the water level was much lower and Lake Malawi split up into many smaller lakes. Explain how speciation of the fish may have occurred following the formation of separate, smaller lakes. (04 marks)

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c) Many species of fish are similar in size and, apart from their colour appearance. Suggest how the variety of colour patterns displayed by these fish may help to maintain the fish as separate species. (02 marks)

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d) State four major sources of genetic variation in a gene pool. (02 marks)

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46. a) Explain what is meant by the term **blood pressure**? (01 mark)

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b) State three factors which affect blood pressure.

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c) What changes occur in the body during acclimatization at a high altitude? (04 marks)

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d) The oxygen dissociation curve of myoglobin is to the left of that of haemoglobin. Explain this phenomenon. (02 marks)

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END