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***P530/1***

***Biology***

*Paper 1*

*July/ August 2022*

*2hours 30minuteS*

# *KAMSSA* JOINT MOCK EXAMINTIONS

## Uganda Advanced Certificate Of Education

BIOLOGY

**Paper 1**

2hours 30minutes

## Instructions to candidates:

- *Answer all questions in both Sections **A** and **B**.*
- *Answers to Section **A must be** written in the spaces provided by the box on the right side of each question.*
- *Answers to Section **B must be** written in spaces provided below each question.*
- *No additional sheets of paper should be inserted in this booklet*

For Examiner's Use Only

| SECTIONS | MARKS |
|---|---|
| A: 1-40 | |
| B: 41 | |
| 42 | |
| 43 | |
| 44 | |
| 45 | |
| 46 | |
| **TOTAL** | |

 ***Turn Over***

SECTION A: (40 MARKS)

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

1. Which one of the following statements is not true torus?
   A. Is made up of lignified materials
   B. Is attached to the secondary cell wall
   C. It acts as a valve in some plants
   D. Is absent in animals

2. In a human with a non-functional pancreas digestion of starch in the ileum would;
   A. Be possible because of suitable pH due to bile.
   B. Not occur for absence of enzymes.
   C. Would be possible because small intestine mucosa contains the necessary enzymes.
   D. Would not occur because of acidic pH in chyme.

3. Which of the following is true about sex-linked characters in humans?
   A. Females never suffer from the traits.
   B. Fathers do not pass on the traits to their sons.
   C. Males are either carriers or sufferers.
   D. Females are either normal or carriers.

4. The similarities of the skeletal structures of moles, monkeys and whales lead to the conclusion that they:
   A. Descend from a common ancestor
   B. Belong to the same class
   C. Evolved by convergent evolution
   D. Originate from the same environment

5. Table 1 shows changes in the heart rate and volume of blood pumped per beat of an adult man while resting and during vigorous exercise.

   Table 1

| Adult man | Heart beat in beats per minute | Volume of blood pumped per beat in $cm^3$ |
|---|---|---|
| Resting | 50 | 50 |
| Exercising | 200 | 75 |

   By how many times was the volume of blood passing through the heart per minute increased during exercise?
   A. 1.5 times B. 3 times C. 6 times D. 4 times

6. An absolute limit imposed by the environment on population increase is called
   A. Biotic potential
   B. Mortality
   C. Carrying capacity
   D. Environmental resistance

7. Which one of the following can be described as instinctive behavior?
   A. A bird building a nest
   B. A man shouting after electric shock
   C. A dog responding to routine meal bell
   D. A dragon fly capturing prey.

8. During heat of the day, control of stomatal movements to reduce excessive water loss is due to
   A. Active accumulation of mineral ions in the guard cells.
   B. Synthesis of abscisic acid.
   C. Inter-conversion of glucose to starch in the guard cells.
   D. Synthesis of glucose during photosynthesis

9. The actual diameter of a cell organelle which measures 0.4mm at magnification of X400 is
   A. 0.1µm B. 0.01 µm C. 1.0 µm D. 0.001 µm

10. The goblet cells are normally supported by:
    A. Squamous epithelium
    B. Stratified epithelium
    C. Cilia
    D. Columnar epithelium

11. Chordates have the following characteristics except:
    A. Dorsal notochord extending into the head
    B. Gill clefts
    C. Dorsal hollow nerve tube
    D. Post anal tail

12. Some bacteria when infected with microphages, may make a particular amino acid they could not make before. This is due to
    A. Transformation
    B. Mutation
    C. Transduction
    D. Conversion

13. Centrioles are short cylinders with a pattern of microtubule triplet. The pattern may be described as:
    A. 9+3  B. 9+2  C. 9+0  D. 9+4

14. Which one of the following pairs of characteristics are both for cnidarians?
    A. Body is radially symmetrical and triploblastic
    B. Body is bilaterally symmetrical and has stinging cells
    C. Body is bilaterally symmetrical and they exhibit polymorphism as polyp and medusa
    D. Body lacks mesoderm and is diploblastic.

15. Which one of the following is not a characteristic of an epiphyte?
    A. Its roots collect nutrients from dripping water
    B. Its roots are on the outside the body of the supporting tree.
    C. It competes for light
    D. It cannot produce its own food

16. Into which one of the following is pyruvate produced in glycolysis converted, before entering the tricarboxylic acid cycle?
    A. Acetyl coenzyme A
    B. Coenzyme A
    C. Ethanol
    D. NADH

17. A desert mammal's lower lethal temperature is higher than that of a mammal living in cold regions because a desert mammal has:
    A. Small extremities
    B. Poor insulation mechanisms
    C. Thick fur
    D. A small surface area to volume ratio

18. The table below shows a system of two cells separated by a semi-permeable membrane.

| Cell X | Cell Y |
|---|---|
| Ψs =-700kpa<br>Ψp=500kpa | Ψs=-900kpa<br>Ψp=400kpa |

    Which one of the following statements is correct about the movement of water in the system?
    A. No water moves out of both cells X and Y
    B. There is net movement of water from cell Y to cell X
    C. There is no net movement of water between the cells.
    D. There is net movement water from cell X to cell Y

19. The primary meristematic tissue in plants that gives rise to the cortex is the
    A. Protoxylem
    B. Protoderm
    C. Procambium
    D. Ground meristem

20. Tension in skeletal muscles does not normally change immediately on receiving a stimulus mainly because
    A. Action potential delays to be formed
    B. Some time is taken for calcium ions to be released
    C. ATP has to first be synthesized from ADP
    D. Actin filaments have to first be moved apart.

21. A young plant cell whose middle lamella and cell wall were observed to be malformed lacking some materials most likely has malfunctioning:
    A. Chloroplasts
    B. Golgi body
    C. Ribosomes
    D. Endoplasmic reticulum

22. An individual whose heart beat remained at 71 beats per minute during a strenuous exercise collapsed: It can be concluded that such an individual had a malfunctioning:
    A. Sinoatrial node
    B. Hindbrain
    C. Atrio-ventricular node
    D. Intercalated discs

23. The reason that contributes to the survival of organisms which live at the bottom of fresh water lakes is;
    A. Cooling water below a certain temperature increases its volume
    B. Freezing water increases metabolism of bottom living organisms
    C. Ice is denser than water
    D. Water has high latent heat of vapourisation

24. The following results were obtained from selfing of F1 generation of pure breeding round, yellow seeded plants with that of, pure breeding wrinkled, and green seeded plants.

| Dominant traits | Recessive traits | Total number of F2 offspring |
|---|---|---|
| Round seeds<br>Yellow seeds | Wrinkled seed<br>Green seeds | 937 |

    What would be the actual number of F2 offspring with wrinkled yellow seeds?
    A. 527 B. 234 C. 176 D. 703

25. Curare is known to block nicotine receptors on neuromuscular junction. Which one of the following explains the fact that it is applied during surgical operations? It
    A. Reduces blood flow in the body
    B. Relaxes the muscles
    C. Causes muscle contraction
    D. Enhances effects of acetyl choline

26. In the gastric glands, the digestive enzymes and hydrochloric acid are produced by the following cells respectively
    A. Kupffer cells and Oxyntic cells
    B. Kupffer cells and Peptic cells
    C. Oxyntic cells and Peptic cells
    D. Peptic cells and Oxyntic cells

27. In estimating the population of an area of $1000m^2$ a $1m^2$ quadrat was thrown 50 times and the total number of weeds counted were 60. What was the estimated population of the weed?
    A. 20
    B. 300
    C. 833
    D. 1,200

28. Young human babies tend to grasp any solid or rod-like object presented into palms of their hands. This behavior is caused by:
    A. Imprinting
    B. Operant conditioning
    C. Classical conditioning
    D. Fixed action patterns

29. Which one of the following statements is not true of the Cytokinins? They
    A. Promote bud formation in protonema
    B. Delay the senescence of leaves
    C. Commonly promote parthenocarpy
    D. Cause certain seeds to germinate
30. Which one of the following is part of the embryonic contribution to placental formation?
    A. Amnion
    B. Chorion
    C. Corona radiata
    D. Yolk sac
31. Nitrogen is often a limiting nutrient in many ecosystems because:
    A. There is much less nitrogen in the atmosphere than carbon
    B. Elementary nitrogen is rapidly used by most organism
    C. Nitrogen availability is being reduced by pollution due to fertilizer use
    D. Most organisms cannot use nitrogen in its elemental form
32. Which of the following terms best describes the resting condition produced across a cell membrane of Giant axon?
    A. Polarized
    B. Depolarized
    C. Neutral
    D. Discharged
33. Which one of the following cells is the most valuable to HIV?
    A. T- Killer cells
    B. T-Suppressor cells
    C. T- Helper cells
    D. Memory cells
34. Bryophytes and pteridophytes cannot fully exploit the terrestrials habitats because they
    A. Lack roots
    B. Are covered by a thick cuticle
    C. Lack well developed vascular system
    D. Depend on water for fertilization
35. Which one of the following does not contribute to the short reaction time in an insect?
    A. Large coverage of the head by the compound eyes
    B. Rapid impulse transmission
    C. High flicker fusion frequency
    D. Many closely packed ommatidia
36. The volume and surface area of four animals A, B, C and D are shown in the following table: Which of the organisms would most need a specialized respiratory system?

| Animals | Volume $cm^3$ | Surface Area $cm^2$ |
|---|---|---|
| **A** | 1 | 6 |
| **B** | 8 | 24 |
| **C** | 64 | 96 |
| **D** | 64 | 28 |

37. Which one of the following ecological effects may not be caused by deforestation?
    A. Species extinction
    B. Reduction in soil fertility
    C. Flooding and landslides
    D. Acid rain

38. A plant has 12 chromosomes in each of its pollen grains. What would be the number of chromosomes in leaves of its offspring formed by by autopolyploidy?
    A. 24
    B. 96
    C. 48
    D. 36

39. Which one of the following events is both true and correctly matched with the effect it causes in the process of skeletal muscle contraction?

| | Event | Effect |
|---|---|---|
| A | Actin filaments slide past myosin | H zone elongates |
| B | Tropomyosin combines with calcium ions | Binding sites are exposed |
| C | Actin filaments overlap each other | Light band shortens |
| D | Troponin combines with calcium ions | Tropomyosin changes shape |

40. Marine cartilaginous fish solve their osmoregulatory problems by:
    A. Swallowing sea water
    B. Actively extruding salts
    C. Retaining urea in their bodies
    D. Excreting trimethylamine

## SECTION B (60 MARKS)

**41.**(a) What is meant by **crossing over**? **(03marks)**

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(b) What is the effect of crossing over in sexually reproducing populations? **(02marks)**

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(c) Explain why a cross between a horse of 64 chromosomes and a donkey of 62 chromosomes is sterile. **(05 marks)**

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42. Doctors measured the thickness of the walls of three blood vessels in a large group of people. The doctors also observed great variations in the thickness of the aorta during each cardiac cycle. Their results are given in the table below.

| Name of vessel | Mean wall thickness |
|---|---|
| Aorta | 5.7 |
| Pulmonary artery | 1.0 |
| Pulmonary vein | 0.5 |

(a) Explain the difference in thickness between the pulmonary artery and pulmonary vein. **(03 marks)**

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**(b)** Explain the great variations in the thickness of the aorta during each cardiac cycle. **(04 marks)**

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**(c)** List three ways by which pressure gradients that aid blood flow in human blood vessels are produced. **(03 marks)**

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43. (a) What is meant by **respiratory quotient**? **(02 marks)**

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(b) For each of the following respiratory quotient values in a green plant, state the type of respiratory substrate being used and the condition in which the process occurs. **(06 marks)**

| Respiratory quotient | Respiratory substrate | Condition in which it occurs |
|---|---|---|
| 1.0 | | |
| 0.7 | | |
| 0.5 | | |

**(d)** Under what circumstances would you expect a respiratory quotient higher than 1.4.
**(02 marks)**

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44. (a) Explain how the following adaptations might assist in homeostasis.

**(i)** The thick fur in an arctic mammal **(02 marks)**

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**(ii)** Elongated loop of Henle in a desert mammal **(02 marks)**

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(b) Giving an example in each case; describe how organisms other than mammal adapt to daily and seasonal changes in temperature.

(i) Daily changes **(03 marks)**

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(ii) Seasonal changes **(03 marks)**

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45.(a) State two locations of the ciliated epithelium in the body of mammals and the function it plays there. **(04 marks)**

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(b) Give three structural differences between epidermis of the leaf of a dicotyledonous plant and the epidermis of a mammal. **(03 marks)**

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(c) How is aerenchyma tissue related to its major function? **(03 marks)**

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46.The growth rate of aerobic heterotrophic bacteria was measured after inoculating some cells into a sterile nutrient broth at 26°C. 1cm$^3$ samples were withdrawn with a pasture pipette at various times to determine the number of living cells in the samples. The results are shown in the table below.

| Time in minutes | Number of cells in millions per cm$^3$ |
|---|---|
| 0 | 11 |
| 5 | 11 |
| 10 | 60 |
| 15 | 422 |
| 20 | 470 |
| 25 | 480 |
| 30 | 260 |
| 35 | 70 |

(a) Calculate the maximum rate of :

**(i)** Decrease in the population **(02marks)**

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**(ii)** Increase in population **(02 marks)**

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(b) Explain how the results would have varied if:

(i) The culture had been maintained in pure nitrogen instead of atmospheric air. **(01 mark)**

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**(ii)** The culture had been maintained at $5^0$C instead of $26^0$C **(02 marks)**

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**(iii)** Another micro-organism having the same nutrient requirement had also been introduced in the medium. **(03 marks)**

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END