

NAME..... STREAM.....

P530/1

BIOLOGY

(THEORY)

Paper 1

2½ Hrs

MENGO SENIOR SCHOOL
UGANDA ADVANCED CERTIFICATE OF EDUCATION
S.6 END OF TERM I EXAMS 2024
BIOLOGY (THEORY)
PAPER ONE
2 HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES:

- *The paper consists of two sections A and B.*
- *Answer **all** questions in both sections.*
- *Section A: consists of 40 questions. Write answers to this section in the boxes provided.*
- *Section B: consist of 6 questions. Write answers to this section in the space provided. No additional sheets of paper should be inserted in this section.*

FOR EXAMINER'S USE ONLY

QUESTION	MARKS	Examiner's Initials
SECTION A 1 – 40		
SECTION B 41		
 42		
 43		
 44		
 45		
 46		
Total		

SECTION A (40 MARKS)

1. Which one of the following determines the number of map units between two genes on a chromosome?
A. Frequency of parentals B. Frequency of recombinants.
C. Number of linkage groups
D. Size of the chromosomes

2. Which one of the following properties of water is important in the dispersal of spores?
A. High tensile strength
B. High surface strength
C. High relative density.
D. Incompressibility

3. Which one of the following events marks the beginning of the spermatogenesis?
A. Enlargement of the germ cells
B. Differentiation of the spermatozoa
C. Halving of nucleic acid content in each germ cell
D. Division of the primordial germ cells

4. Which one of the following doesn't adapt the stratified tissue for its function?
A. Toughness
B. Impervious
C. Greater thickness
D. Single layer of cells

5. Which one of the following factors will least affect the rate of synthesis of a protein in a plant?
A. Relative humidity
B. Temperature
C. Light intensity
D. Carbon dioxide concentration

6. The surface area and volume of the four mammals A,B,C and D are given in table 1. Which of these mammals would survive better in a cold environment? **Table 1.**

Mammal	Surface area (cm ²)	Volume (cm ³)
A	20	5
B	40	80
C	60	60
D	80	100

7. Which one of the following plant tissues lacks fibres?

- A. Xylem
- B. Phloem
- C. Sclerenchyma
- D. Collenchyma

8. Which one of the following structures prevents the mammalian heart from being over stretched?

- A. Chordae tendinae
- B. Mitral values
- C. Pericardium
- D. Cardiac muscles.

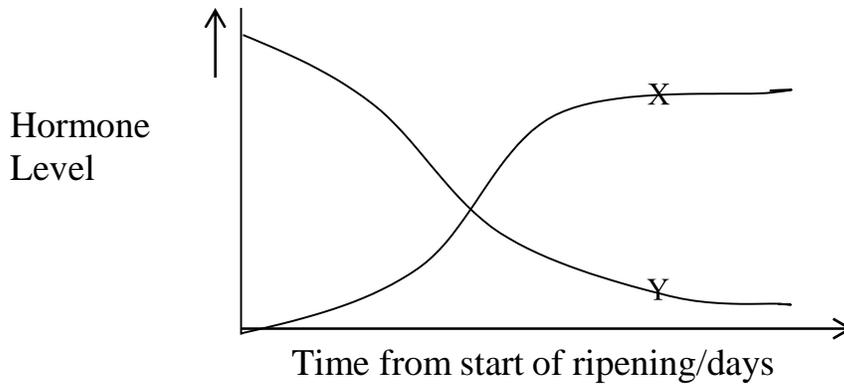
9. Which one of the following features is not common to both arthropods and annelids?

- A. Metameric segmentation
- B. Bilateral symmetry
- C. Triploblastic coelomate
- D. Jointed appendages

10. The most efficient vertebrate respiratory system is found in

- A. Birds
- B. Mammals
- C. Fish
- D. Reptiles

11. Figure 1 shows the changes in levels of hormones X and Y in a ripening seed.



Hormones X and Y respectively are;

- A. Ethane and cytokinin
- B. Ethane and gibberellins
- C. Abscissic acid and auxins
- D. Auxins and gibberellins

12. Which one of the following may limit an organism from colonizing terrestrial habitat?

- A. Development of pollen tube
- B.
- C. Shelled eggs
- D. Internal fertilization
- E. Flagellated gametes

13. Which one of the following is the significance of the fluffy nature of down feathers during flight in birds?

- A. Minimize drag
- B. Increase strength of each wing
- C. Improves on the streamlining of the body
- D. Provide high levels of insulation.

14. Which one of the following is correct about the venous end of a capillary bed?

- A. Blood pressure is high
- B. Water moves out of the capillaries
- C. Solute potential of plasma proteins decreases.

- D. Solute are actively transported into the capillaries
15. Which one of the following would occur immediately following entry of sodium ions into the post synaptic neurone?
- A. Hyper polarization
 - B. Depolarization
 - C. Repolarization
 - D. Generation of action potential
16. The cause of negative growth at the onset of seed germination is;
- A. Imbibition of water
 - B. Mobilization and reduction of foods reserves
 - C. Rupturing of the seed coat
 - D. Formation of foliage leaves
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17. Which one of the following parts of a nephron contributes most to the survival of the desert rat?
- A. Bowman's capsule
 - B. Proximal convoluted tubule
 - C. Distal convoluted tubule
 - D. Loop of Henle
18. Which one of the following structures of a moss contains the same genetic condition as that of a spermatozoan?
- A. Spores
 - B. Spore mother cells
 - C. Zygote
 - D. Sporangium

19. Figure 2 shows the effect of temperature on leaf burial by earthworms.

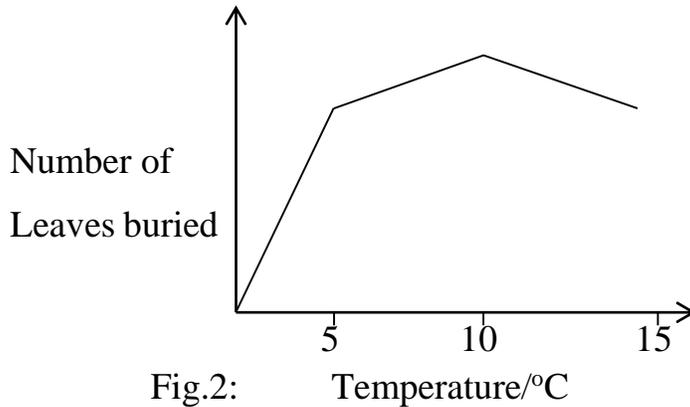


Fig.2: Temperature/°C

Which is the best conclusion from this figure?

- A. Activity of earthworms increases with increase in temperature
- B. Activity of earthworms decreases with increase in temperature
- C. Temperature of earthworm's habitat vary seasonally
- D. Very Low temperatures make earthworms dormant.

20. Which one of the following preserves existing allele frequencies in a population?

- A. Stabilizing selection
- B. Disruptive selection
- C. Directional selection
- D. Prevalent selection

21. What type of behaviours enables small mammals to become familiar with their home territories?

- A. Latent learning
- B. Insight learning
- C. Imprinting
- D. Habituation

22. Which one of the following is true about meiosis? It involves

- A. two divisions and two rounds of DNA replication
- B. two divisions and one round of DNA replication
- C. one division and two rounds of DNA replication
- D. one division and one round of DNA replication



23. Which one of the following is the effect of removing carnivores from an ecosystem?
- A. Increase in productivity of pastures
 - B. Decrease in the number of herbivores
 - C. Increase in productivity of tertiary consumers
 - D. Decrease in the amount of vegetation cover
24. Which one of the following physiological processes doesn't require calcium ions?
- A. Response to gravity
 - B. Muscular contraction
 - C. Transmission of nerve impulse across synapses
 - D. Transmission of nerve impulse along axons
25. Which one of the following cell structures promotes the growth of bacteria on other surfaces?
- A. Cilia
 - B. Nucleoid
 - C. Flagella
 - D. Fimbriae
26. Which one of the following tissues is most likely to be the source of nutrients for insects that parasitise trees?
- A. Primary xylem
 - B. Vascular cambium
 - C. Secondary xylem
 - D. Cork
27. Which one of the following is not an advantage of breathing air over breathing water?
- A. Air is less dense than water, so it takes less energy during ventilation
 - B. Oxygen diffuses faster through air than in water
 - C. Oxygen content of air is greater than that of an equal volume of water
 - D. Air breathing leads to high evaporation rates from the respiratory surface
28. Which one of the following enzymes is not secreted by the lining of the ileum?
- A. Enterkinase
 - B. amylase
 - C. Lipase
 - D. Sucrase



29. Wearing a hairy shirt causes unpleasant sensation at first but later the discomfort disappears because;
- A. the post synaptic membrane cease to release the transmitter substance
 - B. the sensory system becomes overloaded with sensory impulses
 - C. there is continuous transmission of nerve impulses across synapses
 - D. there is a decline in the generator potentials provided by sensory receptors

30. Which one of the following is not correct about tetraploid organisms? They
- A. have two complete sets of homologous chromosomes
 - B. can form homologous pairings during garment formation
 - C. can be propagated by both sexual and asexual means
 - D. are usually sterile

31. Figure 3 shows the change in numbers of pathogenic bacteria during an infection of the human body.

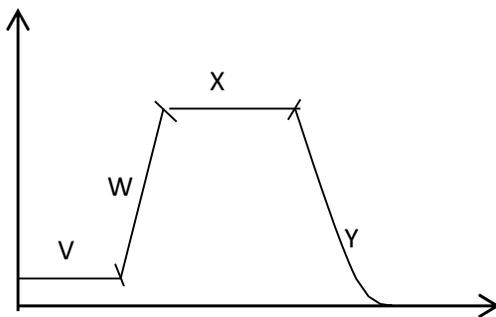


Fig.3:Time

In which region of the curve is the rate of the immune response of the body equal to the reproductive rate of the bacteria?

- A. V
 - B. X
 - C. W
 - D. Y
32. Which one of the following is absent in the matrix of the mitochondrion?
- A. Ribosomes
 - B. Traces of DNA
 - C. Lipids
 - D. Stalked particles

33. Hydrophytes do not have support tissues because they
- lack roots where support tissues are found.
 - have parenchyma tissue which makes them buoyant
 - obtain support from the higher density of water
 - have a lignified epidermis that provides additional sup
34. Which of the methods is suitable for estimating the population size of animals that congregate in open places.
- Capture-recapture
 - Quadrat method
 - Aerial photograph.
 - Removal method.
35. Table 2 shows the rate of oxygen consumption by different tissues of a dicotyledonous plan. Which of these tissues would be most affected by a metabolic poison?

Tissue	Oxygen consumption ($\text{mm}^3 \text{O}_2 \text{S}^{-1} \text{hr}^{-1}$)
Vascular tissue	800
Whole leaves	400
Petioles	200
Taproots	40

36. Which one of the following factors limits cartilaginous fishes from having efficient gaseous exchange systems?
- Possession of small sized gill plates
 - Parallel flow of water and blood across the gill plate
 - Absence of an operculum to enclose the gills
 - Are surrounded with salty water of low oxygen content
37. Mutualistic associations are important in the following processes except;
- production of enzymes
 - production of vitamins
 - fixation of nitrogen
 - recycling of carbon

38. Which one of the following events occurs at the beginning of ventricular systole?

- A. Ventricular pressure exceeds atrial pressure
- B. Atrial pressure exceeds ventricular pressure
- C. Atrioventricular valves are opened
- D. Semilunar valves are closed

39. One reason why starch lacks structural properties possessed by cellulose is that it

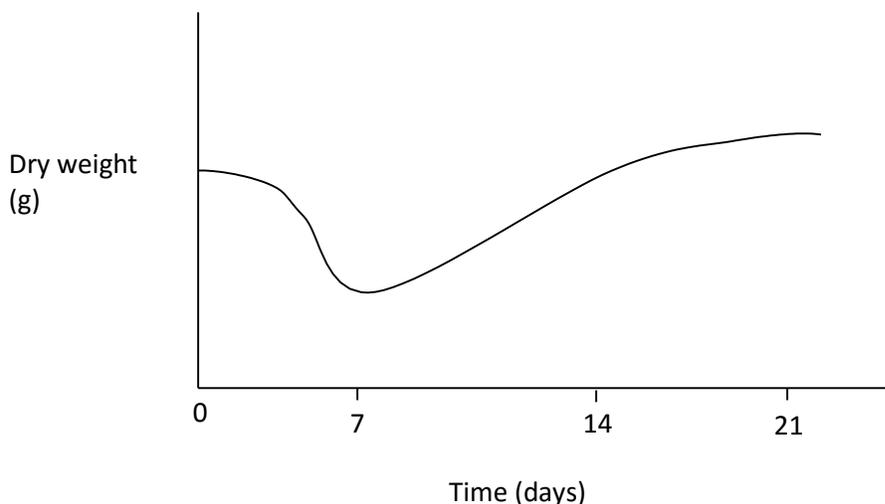
- A. lacks cross linkages
- B. lacks folded chains
- C. has fewer microfibrils
- D. has shorter chains

40. Which one of the following events of photosynthesis is not directly affected by light intensity?

- A. Photolysis of water
- B. Emission of electrons from chlorophyll
- C. Chemiosmotic synthesis of ATP
- D. Conversion of PGA to PEP

SECTION B: (60 MARKS)

41. (a). Figure 3 below shows the changes in dry weight of a germinating bean.



(a) Explain the changes

(i) In the first seven days

(03 marks)

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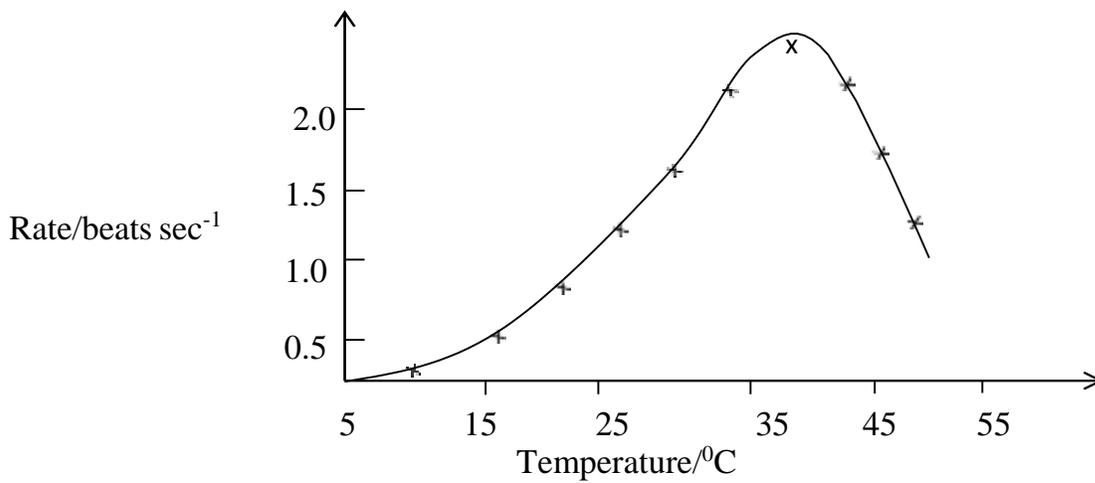
(ii) Between the seventh and twenty first day (04 marks)

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(b) Give the major factors that cause seed dormancy. (03 marks)

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42. Figure 4 shows the effect of temperature on the heart rate of a locust.



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(a) Describe the changes in the rate of heart beat (04 marks)

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(b) Explain the effect of temperature on the rate of heart beat. (04 marks)

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(c) Explain how the rate of heart beat of a rat would differ from that of a locust. (02 marks)

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43. (a) Distinguish between primary productivity and secondary productivity (02 marks)

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(b) Give five reasons why much of the solar energy doesn't contribute to primary Productivity in plants. (05 marks)

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(c) Explain why carnivores have a higher productivity than herbivores. (03 marks)

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44. An individual was made to undertake a vigorous exercise and his respiratory quotient (RQ) was measured immediately after the exercise for one hour. **Figure 5** shows the results of the investigation.

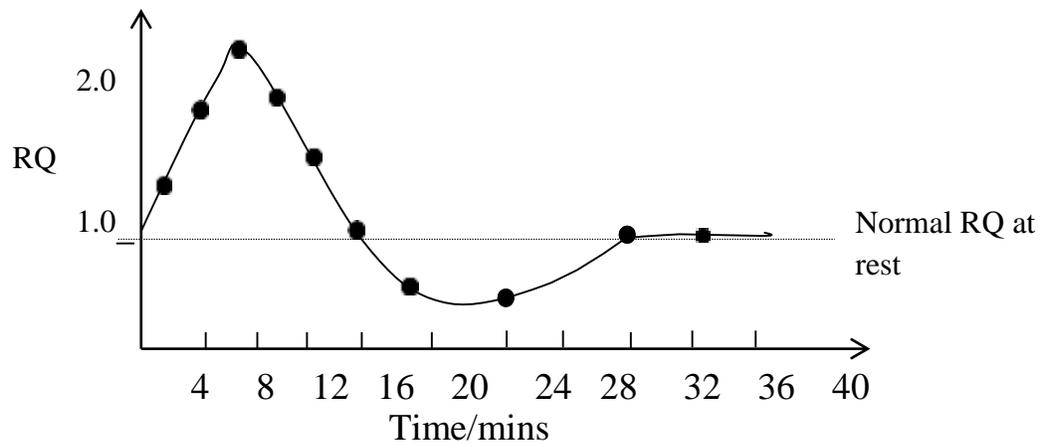


Fig.5

(a) What is meant by respiratory quotient? (01 mark)

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b) Explain the;

i) rise in RQ up to the 6th minute (03 marks)

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ii) fall in RQ from the 6th to 16th minute (04 marks)

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c) Explain why the **RQ** falls below the normal **RQ** of a resting human. **(02 marks)**

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45. (a) State the difference between a **C₃** and a **C₄** plant. **(02 marks)**

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b) Explain how the structure of **C₄** plants adapts them to avoid photo respiration. **(04 marks)**

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d) Explain the photosynthetic pathway that operate in plants living in the following areas

i) Hot dry areas **(02 marks)**

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ii) High altitude areas

(02 marks)

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46.(a) Draw and label a transverse section of an anther head.

(03 marks)

(b) State the differences **four** between gametogenesis in plants and that in animals. (02 marks)

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(c) Briefly explain how a young embryo sac develops into a mature ovule.

(05 marks)

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