Name……...……Combination……

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P530/1
Biology Paper 1
2 hours 30 minutes

MENTOR SECONDARY SCHOOLS EXAMINATIONS
Uganda Advanced Certificate of Education
BIOLOGY (Theory)
S.5 BEGINING OF TERM TWO EXAMINATIONS 2023
Paper 1
2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:
*This paper consists of **20** questions in section **A** and **5** questions in section **B.***
*Answer **ALL** questions in both sections **A** and **B**.*
***Section A**: Answers to this section **MUST** be written in the boxes provided.*
***Section B:** Answers to this section should be written in the spaces provided and **NOT** anywhere else.*
***NO** additional sheet(s) of paper should be inserted in this booklet.*

FOR EXAMINERS ONLY			
SECTION		MARKS	Examiners initials
Section A	1-20		
	21		
	22		
	23		
	24		
	25		
	26		
TOTAL			

SECTION A

1. If a messenger RNA has a base sequence of CUGACGAGU, which one of the following would be the possible maximum number of amino acids coded for, if the code is overlapping?

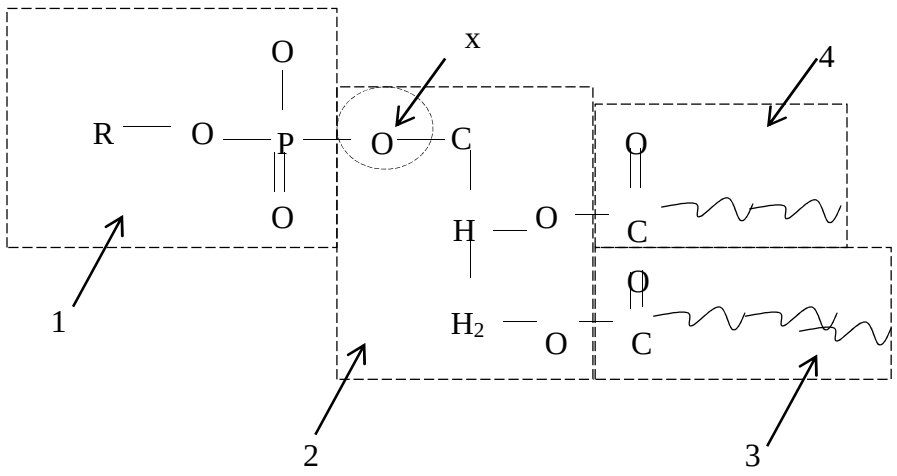
   A. 7
   B. 6
   C. 3
   D. 4

2. The two strands of DNA easily separate during replication because of the

   A. helical nature of the nucleotide
   B. the closeness of the base pairs
   C. weak hydrogen bonds between the base pairs

D. the week hydrogen bonds between phosphate and sugars.

3. The figure below represents a simplified structure of a phospholipid molecule. Use it to answer question



Which of the following is the hydrophilic part of the molecule?

A. Part labeled 1
B. Part labeled 2
C. Part labeled 3
D. Parts labeled 3 and 4

4. Sucrose is a non-reducing sugar because it

A. It is not fully digested
B. It lacks reducing groups
C. Is a disaccharide molecule
D. Is a ketose sugar

5. Which of the following best describes a plant cell which is fully turgid?

A. Pressure potential of the cell is zero
B. Water potential of the cell sap is equal to osmotic potential of the sap
C. Pressure potential is equal to osmotic potential of the sap
D. Osmotic potential is zero

6. Squamous epithelium is made up of thin and delicate sheets of cell as an adaptation to

A. Rapid cell division

B. Facilitation of liquid movement
C. Shortening diffusion distance
D. Protecting the body from abrasion

7. Which on of the following characteristics is not used in classifying amphibian and reptile together?
   A. Post-anal tail
   B. Two pairs of pentadactyl limbs
   C. Notochord
   D. Nerve chord

8. The following are characteristics of amphibian.
   (i) Have moist skin
   (ii) Carry out external fertilization
   (iii) Use gills at early stage for respiration
   (iv) Use lungs for respiration

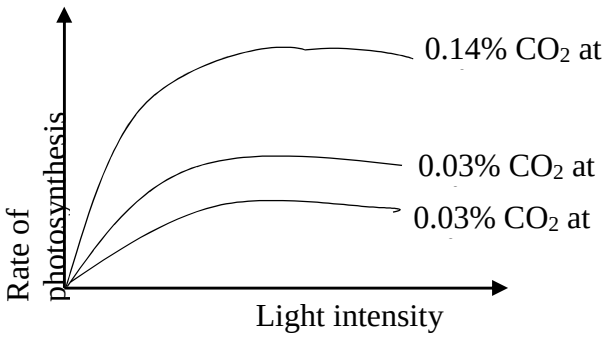
   Which one of the following pairs of characteristics limit them from inhabiting a totally terrestrial environment?

   A. (i) and (ii)
   B. (ii) and (iii)
   C. (iii) and (iv)
   D. (i) and (iv)

9. Which one of the following tissues has the least power of regeneration?

   A. Blood tissue
   B. Epithelial tissue
   C. Bone tissue
   D. Nerve tissue

10. Which of the following is illustrated in the figure below?



A. With increase in light intensity, the rate of photosynthesis increase until temperature becomes a limiting factor.
B. Rate of photosynthesis increases with an increase in the carbon dioxide concentration
C. With increase in light intensity, the rate of photosynthesis increases indefinitely
D. Rate of photosynthesis increases with an increase in light intensity until carbon dioxide becomes a limiting factor.

11. In photosynthesis, the major advantage of the C4 pathway is to

A. Fix carbon dioxide in the Calvin cycle
B. Concentrate carbon dioxide in the cells of leaves
C. Fix carbon dioxide from the atmosphere into the leaves
D. Store carbon dioxide in form of organic acids

12. Which one of the following water relation is not true about a plasmolyzed plant cell?

A. Tugor pressure is zero
B. Pressure potential is equal to osmotic potential of sap
C. Pressure potential is zero
D. Water potential of the cell is equal to osmotic potential of cell sap

13. Which one of the following describes facilitated diffusion?

A. Molecules are moved by protein carriers from a region of high concentration to a region of low concentration
B. Water molecules move across a semi-permeable membrane
C. Molecules move from a region of high to low concentration
D. Energy is used when molecules are moved across a cell membrane

14. Starch and glycogen are suitable storage molecules because they;

A. are large in size which makes them less soluble in water
B. are chemically reactive in cell
C. can easily be hydrolysed
D. exert an osmotic pressure in the cell

15. The enzyme that catalyzes the rearrangement of molecular structure by addition of molecules are called

A. Transferases.
B. Isomerases.
C. Oxidoreductases.
D. Ligases.

16. Walls of plant cells are largely composed of polysaccharides and proteins that are synthesized

A. externally to the plasma membrane.
B. in the smooth endoplasmic reticulum.
C. in the golgi apparatus.
D. in both the rough endoplasmic recticulum and golgi apparatus

17. Two cells A and B have water potentials of -2000 kPa and -1000kPa respectively. Which one of the following statements is true about the cells?
A. Cell A has a higher concentration of water molecules than cell B.
B. Cell A has a higher solute potential than cell B
C. There is a net movement of water from cell A to cell B
D. Cell A has a less solute concentration than cell B

18. Which of the following is an advantage of carbon-3 plants over carbon-4 plants and CAM plants

A. dark stage of photosynthesis occurs in only one type of cell
B. dark stage of photosynthesis consumes less energy
C. dark stage of photosynthesis occurs all day and night
D. the plants occupy a wider range of habitants

19. A plant cell is magnified x2000 and the length of one chloroplast is 16mm. What is the actual length of the chloroplast in micrometres?

A. 16 B. 8 C. 1600 D. 32000

20. In HIV virus, the role of enzyme "reverse transcriptase" is to ……

A. unite viral DNA with host's DNA.
B. release viral RNA to make proteins.
C. transfer DNA from the host into the virus.
D. make DNA from virus RNA

SECTION B

21. (a) what is meant by the term membrane fluidity?(01 mark)

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(b) (i) Explain any of the three factors that affect the membrane fluidity of the cells (03 marks)

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(ii) of what importance has regulating the membrane fluidity got? (01 mark)

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(c) Explain why lipid soluble molecules diffuse more rapidly through membranes than lipid insoluble molecules**.** (3 marks)

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(d) Explain the functional significance of cell size and cell shape. (02 marks)

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22. (a) State where each of the following is found in a cell (1mark)

DNA ……..

RNA ……..

(b) Give three structural differences between DNA and RNA (3marks)

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(c) What is the genetic significance of DNA replication? (2marks)

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(d) Describe the biological function of amino acids (4 marks)

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23. (a) state three ways in which water has similar functions in both plants and animals. (3marks)

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(b) Give two ways, in each case, in which flowering plants minimize water loss through

(i) behavioral means (4marks)

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(ii) physiological means (4marks)

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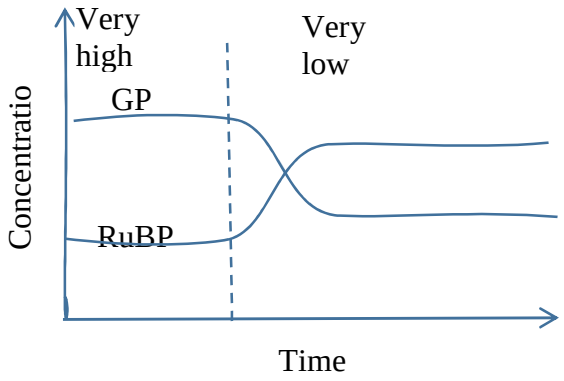
24. The figure below shows the concentration of glycerate-3-phosphate (GP) and ribulose bisphosphate (RuBP) during an investigation in which a sample of Chlorella was allowed to photosynthesise at very low and very high carbon dioxide levels



(a) Explain the changes in the concentration of RuBP at
(i) High carbon dioxide concentration (01mark)

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(ii) Very low carbon dioxide levels (2 marks)

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(b) Suggest why the concentration of GP falls when the level of carbon dioxide is reduced (1mark)

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(c) Name two factors which must be kept constant in the investigation (2 marks)

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(d) Give four differences between cyclic and noncyclic photophosphorylation. (4marks)

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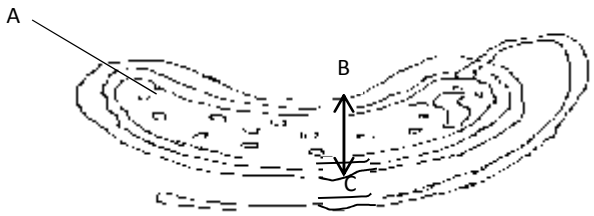
25. The diagram shows a cholera bacterium. It has been magnified 50,000 times.



a) Name A

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b) Give two structures presents in an epithelial cell from the ileum that are not present in the figure above. *(02marks)*

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c) The bacteria can be viewed using a transmission electron microscope (TEM) or scanning electron microscope. (SEM).

(i) Give one advantage of using TEM rather than SEM. *(01mark)*

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(ii) Give one advantage of using SEM rather than TEM. *(01mark)*

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d) Calculate the actual width of the cholera bacterium between points B and C giving your answer in micrometers. *(02marks)*

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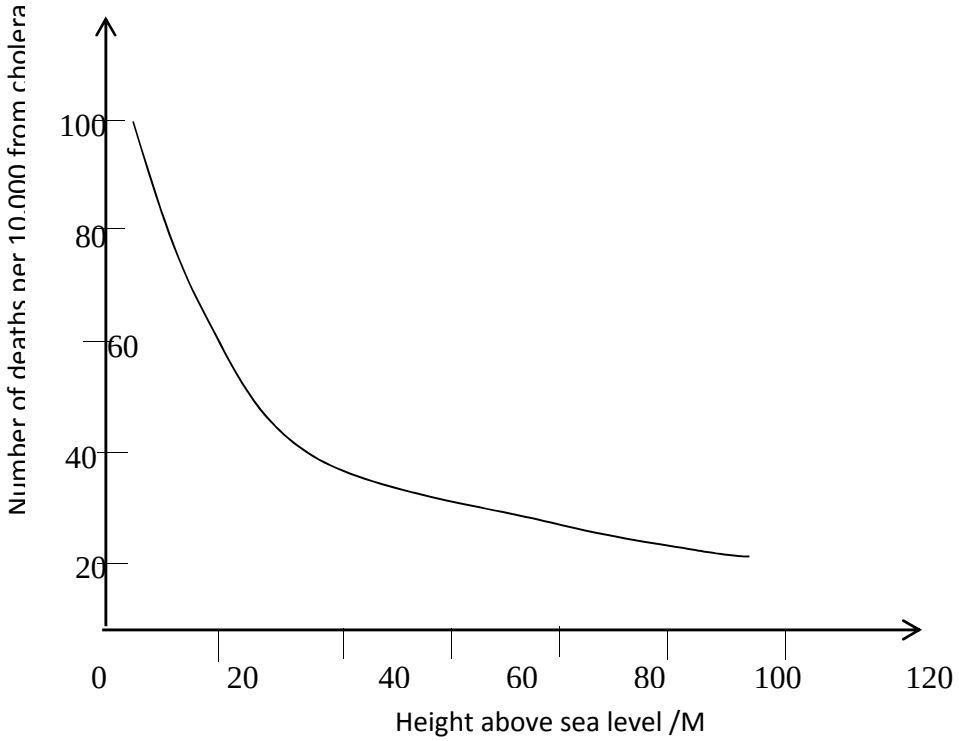
e) The graph below shows the relationship between the number of deaths from cholera and the height at which people live above sea level.



(i) Explain the relationship between the number of deaths from cholera and the height at which people live above sea level. *(03marks)*

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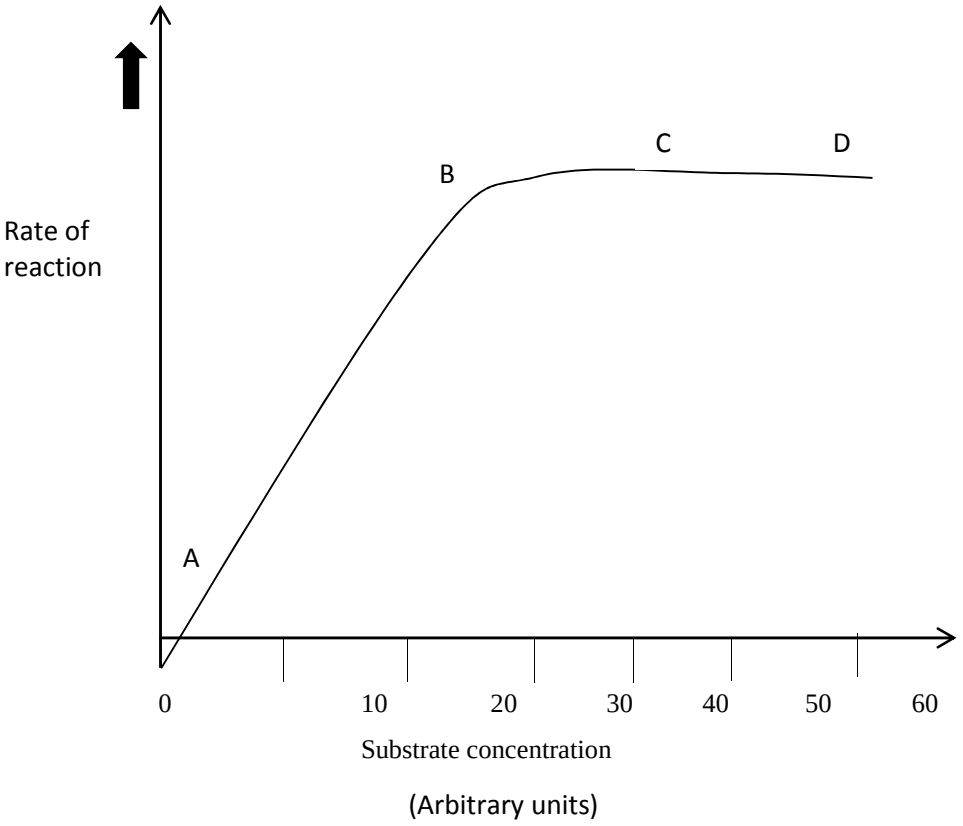
26. The graph shows the effect of substrate concentration on the rate of an enzyme controlled reaction.



a) (i) Describe what the graph shows about the effect of substrate concentration on the rate of this enzyme controlled reactions. *(03marks)*

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(ii) What limits the rate of reaction between points A and B? Give the evidence from the graph for this. *(02marks)*

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(iii) Suggest a reason for the graph shape between points C and D. *(01mark)*

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b) Sketch a curve on the graph to show the rate of this reaction in the presence of a competitive inhibitor. *(02marks)*

c) Explain how drugs lower the rate of reaction. *(02marks)*

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THE END