Name……...……Combination……

Signature……...……...
P530/1
Biology Paper 1
2 hours 30 minutes

SAVANA SECONDARY SCHOOL
DEPARTMENT OF BIOLOGY
Uganda Advanced Certificate of Education
BIOLOGY (Theory)
S.5 END OF TERM 3 EXAMINATIONS 2024
Paper 1
2 hours 30minutes

INSTRUCTIONS TO CANDIDATES:

*This paper consists of **40** questions in section **A** and **6** 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 EXAM NERS ONLY			
SECTION		MARKS	Examiners initials
Section A	1-40		
	41		
	42		
	43		
	44		
	45		
	46		
TOTAL			

SECTION A

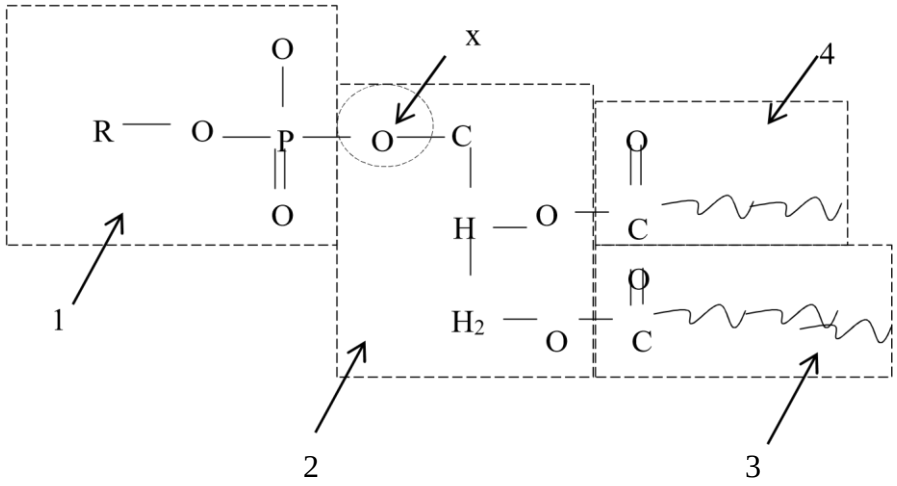
1. If a messenger RNA has a base sequence of CUGACGAGU, which one of the following would be the possible maximum number of amino acids coded for, if the code is overlapping?

   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

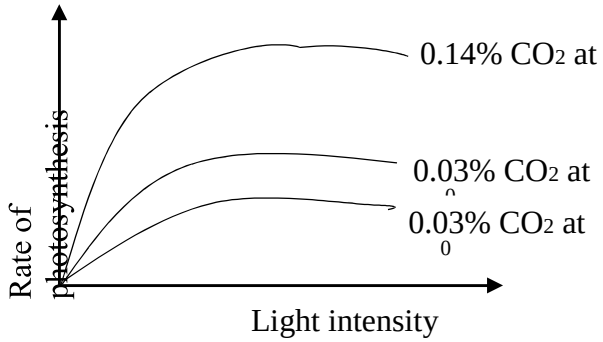
Which one of the following pairs of characteristics limit them from inhabiting a totally terrestrial environment?

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

21. Which one of the following processes is not affected by changes in oxygen concentrated?

A. Exocytosis
B. Phagocytosis
C. Facilitated diffusion
D. Pinocytosis

22. During non-cycling electron pathway of photosynthesis, electrons are lastly accepted by

A. NADP
B. ferredoxin
C. cytochrome

D. D. water

23. When an allele exerts multiple effects on the phenotype of an individual, it is said to be

A. epistatic
B. polygenic
C. pleitropic
D. polyploidy

24. Which of the following ions are essential in the transmission of the nerve impulses?

A. Sodium ions
B. Potassium ions

C. Chloride ions
D. Carbonate ions

25. In plants, cell enlargement is caused by an interaction of
A. ethene and abscisic acid
B. cytokinins and ethane
C. gibberellin and auxins
D. . cytokinins and abscisic acid

26. Which one of the following organelles is abundant in a phagocytotic cell?
A. Golgi apparatus
B. Lysosomes
C. Microbodies
D. Centrosomes

27. Figure 2 shows the rate of photosynthesis at different light

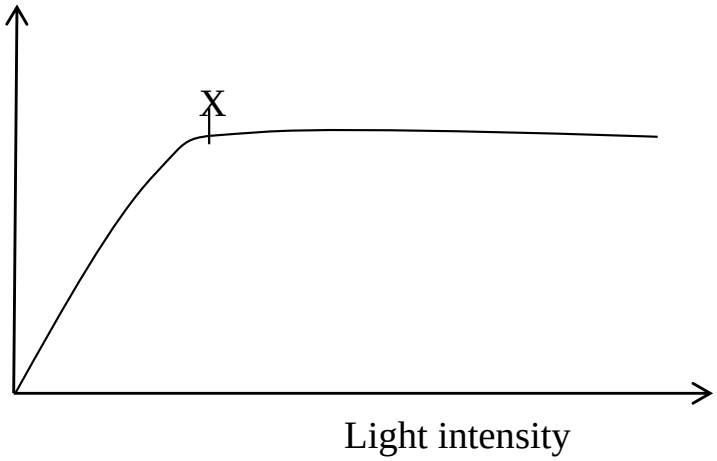


Fig 2

The factor limiting carbohydrate synthesis below point X is
A. light intensity
B. temperature
C. carbon dioxide concentration
D. chlorophyll concentration

28. .In plants, the strength of the walls of the xylem vessels is mainly attributed to the presence of;

A. pectins
B. cellulose
C. liginin
D. murein

29. How many water molecules are produced when 20 molecules of glycerol are used to synthesise triglycerides
A. 15
B. 30
C. 60
D. 90

30. Which of the following processes would be most affected by low rates of respiration?
A. Transcription
B. Translation
C. Transduction
D. Transformation

31. How are enzymes and inorganic catalysts similar? They are both
A. highly specific in the reactions they catalyze
B. affected by changes in pH
C. Affected by changes in temperature.
D. unchanged at the end of a reaction

32. An enzyme which catalyses the conversion of a dipeptide into separate amino acids is an example of
A. dehydrogenase
B. hydrolase
C. decarboxylase
D. transferase

33. Which of the following body organs would be lined with a ciliated pseudo stratified columnar epithelium
A. nephrones
B. ileum
C. urinary bladder

D. D. trachea

34. . Which one of the following glands is compound saccular?

A. mammary glands

B. sebaceous glands

C. sweat glands

D. D. gastric glands

35. Which of the following organelles is associated with the final stage of most cell secretions?

A. smooth endoplasmic reticulum

B. rough endoplasmic reticulum

C. ribosome

D. D. Golgi apparatus

36. Which of the following describes the conditions in a photosynthesizing cell exposed to high light intensity and low carbon dioxide concentration?

	RuBP	**ATP**	**GP**
A.	high	high	low
B.	high	low	low
C.	low	high	high
D.	low	low	high

37.

37. If a radioactively labeled amino acid were taken up by a secretory cell, what is the correct sequence of structures in which radioactivity would appear?

A. Cytoplasm, endoplasmic, Golgi apparatus

B. Endoplasmic, reticulum nucleus, lysosome

C. Lysosome, nucleus, Golgi apparatus

D. Mitochondria, endoplasmic reticulum, lysosome

38. Auxins promote a plant to grow towards a light source by

A. Increasing the rate of cell division on the shaded side of them

B. Shortening the cells on the light side of the stem

C. Causing cells on the shaded side of the stem to elongate

D. Decreasing the rate of cell division on the light side of the stem

39. In tomatoes the allele for red fruit (R) is dominant to that for yellow fruit and the allele for tallness (T) is dormant to that for shortness. In the cross RrTT X rrTt what are the chances that an offspring being homozygous for both traits?
    A. 6/16
    B. 9/16
    C. 1/4
    D. 1/2

40. Which one of tissues are responsible for secondary growth in plants?
    A. Phloem and xylem
    B. Cortex and pith
    C. Epidermis and periderm
    D. Cork cambium and vascular cambium

SECTION B (60MARKS)

41.(a) State **two** roles of membranes within cells. (*02 marks*)

……

……

……

……

(b). Give **four** reason why most biological molecules do not diffuse freely across cell membranes. (*04 marks*)

……

……

……

……

……

……

……

……

(c). Explain why the structural arrangement of the cell membrane is described as Fluid mosaic. (*04 marks*)

.....

.....

.....

.....

.....

41. (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)

.....

.....

.....

.....

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

.....

.....

.....

.....

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

.....

.....

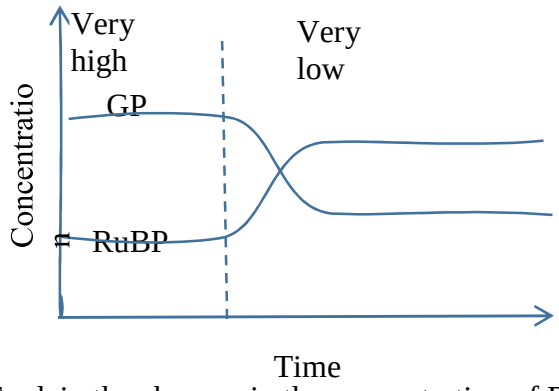
.....

.....

.....

.....

42. 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)

……

……

……

……

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

……

……

……

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

……

……

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

……

……

……

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

……

……

……

44. .(a) Distinguish between a **nerve impulse** and an **action potential**. (*02 marks*)

……

……

……

……

……

(b) Explain why nerve impulses are transmitted in a single direction

(i) across the synapse. (*04 marks*)

……

……

……

……

……

……

(ii) along an axon membrane of a nerve. (*03 marks*)

……

……

……

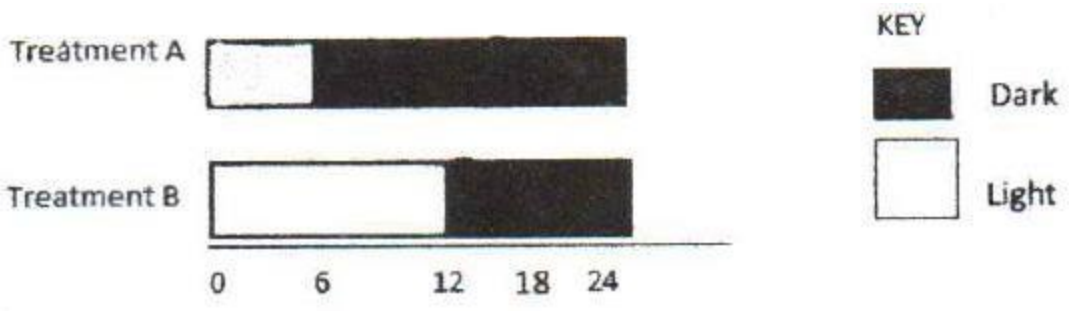
……

(c) Give a reason why endotherms have a faster impulse transmission than ectotherms of the same axon diameter. (*01 mark*)

……

……

45. (a) Two groups of short-day plants were each subjected to different treatment of light and dark periods as shown in figure 3



(b) Explain how each of the treatment would affect flowering response in the two groups of plants.

(i) Treatment A (2marks)

……

……

……

……

……

……

(ii) Treatment B (2maeks)

……

……

……

……

……

……

……..

(c) In a second series of experiments the group in (a) which had been exposed to long dark periods was flashed with red and far red light in the middle of the dark periods. Giving a reason suggest the flowering response expected in plants flashed with

(ii), Red light (03marks)

……

……

……

……

……

……

(ii). Far red light (02 marks)

……

……

……

……

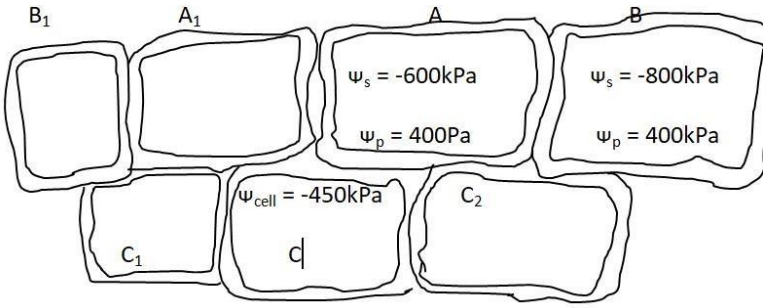
……

(d) What conclusion can you draw from the results of experiment in (a)? (01 mark)

……

……

46. .Figure below shows two guard cell A and A_1, with adjacent cells B, B_1, C, C_1 and C_2. The values of the solute potential and pressure potential shown in cell A and B are exactly the same as those for cell A_1 and B_1 respectively. Similarly, the water potential indicated in cell C is the same as in cell C1 and C2. Use the figure to answer the questions that follow.



(a) (i) calculate the water potential of cell A and B (02marks)

……
……
……
……
……
……

(ii) Show by means of arrows the movement of water in the seven cells (03marks)

(b) Explain why the net movement of water in the cell is as you have indicated in (a)(ii)
(03marks)

……
……
……
……

(c) What would be the effect of the net movement of water indicated in (a)(ii) to guard cells
A and A1? (02marks)

……
……
……

END