NAME:..... .....DATE ..... Signature.....

Random No.						Personal No.		

Uganda Advanced Certificate of Education
SENIOR SIX
BIOLOGY (THEORY)
P530/1
2hours 30minutes

INSTRUCTIONS TO CANDIDATES:

*Answer all questions in both sections **A** and **B**.*
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**
A: 1-40		
B: 41		
42		
43		
44		
45		
46		
Total		

SECTION A (40 MARKS)

1. Adaptations of plants to obtain nitrogen includes all the following except:
   A. being insectivorous.
   B. possession of aerial roots.
   C. presence of bacteria in root nodules.
   D. association with mycorrhiza on plant roots.

2. One of the structural similarities between starch and glycogen is that both
   A. are made of alpha glucose monomers
   B. have branched chains
   C. consist of both 1,4 – and 1,6-glycosidic bonds
   D. consist of both branched and unbranched chains

3. All autotrophic bacteria
   A. use hydrogen sulphide as their raw material
   B. obtain hydrogen from sources other than water
   C. trap energy using bacterial chlorophyll
   D. use carbon dioxide as their raw material.

4. Both glucose and fructose have the same molecular formula $C_6H_{12}O_6$ but some of their chemical properties differ because
   A. glucose has a straight chain whereas fructose a ring structure.
   B. the positions of the OH groups on the sugar molecules are different
   C. fructose is a ketose while glucose is an aldose
   D. glucose has a ring structure while fructose has a straight chain

5. The following conditions show trisomy, EXCEPT:
   A. Klinefelter's syndrome. B. Turner's syndrome.
   C. Down's syndrome. D. XXX female.

6. When the osmotic potential of red blood cells lowers, then their
   A. osmotic pressure increases
   B. water potential decreases
   C. osmotic influx of water decreases
   D. rate of haemolysis is likely to reduce

7. Which one of the following pairs of substances constitute the matrix of hyaline cartilage?
   A. Chondrin and chondrocytes
   B. chondrin and collagen fibres
   C. Ground substance and elastic fibres
   D. collagen and elastic fibres

8. Which one of the following pairs of enzymes are involved in the final steps of respiration?
   A. Transferases and phosphokinases
   B. Decarboxylases and oxidases
   C. Isomerases and transaminases
   D. Decarboxylases and dehydrases.

9. The following structures are found the heart
   (i) bundle if His (ii) purkinje tissue
   (iii) atrioventricular node (iv) sino atrio node
   Which of the following structures show the correct sequence of the impulse conduction through the heart?
   A. iii, iv, I, ii B. iii, iv, ii, & I C. iv, iii, ii & I D. iv, iii, ii & i

10. Even after maximum forced expiration, the lungs cannot collapse because of the
   A. dead air space B. residual air
   C. tidal volume D. vital capacity

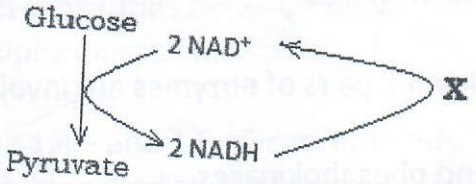
11. Secretion of the non-enzymatic component of pancreatic juice is triggered by the hormone
   A. secretin B. enterogastrone
   C. cholecystokinin D. gastrin

12. The major role of accessory pigments in a chloroplast is to
   A. allow maximum absorption of light of a particular wave length.
   B. increase the range of wavelengths from which energy is obtained
   C. maximize light absorption even at low light intensities
   D. absorb light of wavelengths that is transmitted by other pigments.

13. The following are hydrolytic enzymes in the small intestine of human alimentary canal EXCEPT.

A. lipase B. enterokinase C. amylase D. trypsin

14. The scheme in the figure below is an incomplete representation of a respiratory pathway.



Under what circumstances will the pathway X be blocked? When

A. there is accumulation of lactic acid
B. the cell's internal supply of NAD^+ is rapidly reduced.
C. oxygen is not available.
D. there is limited supply of glucose.

15. The product of the first meiotic division during spermatogenesis is

A. Spermatid B. Spermatogonia
C. primary spermatocyte D. Secondary spermatocyte

16. Which one of the following is true about sex limited characteristics? They

A. are controlled by genes located on X sex chromosomes.
B. are more common in males than in females.
C. are controlled by autosomal genes.
D. often threaten survival of the bearer.

17. During excretion in insects, which of the following enters the Malpighian tubule passively?

A. K^+ and Na^+ B. salts and water
C. carbon dioxide and water D. uric acid and ammonia

18. In plant the primary meristem comprises

A. apical meristem, vascular cambium and cork cambium
B. vascular cambium protoderm and procamium
C. ground meristem protoderm and procambium
D. epidermis, apical meristem vascular cambium

19. Lateral inhibition in mammalian eye is attributed to

A. cones and amacrine cells
B. horizontal and cone cells
C. amacrine and horizontal cells
D. cone and rods only.

20. Which one of the following factors does not determine the height in a gliding bird?

A. Metabolic rate
B. Shape of the wing
C. Increased size of the wing
D. angle of attack

21. Which one of the following is not a pre-mating isolation mechanism?

A. Seasonal isolation
B. behavioral isolation
C. habitat isolation
C. hybrid sterility

22. During stress, conversion of glycogen into glucose is stimulated by

A. insulin B. glucagon C. thyroxine D. adrenaline

23. Which of the following can lead to genetic death in a population?

A. sickle cell trait
B. infertility in males
C. hemophilia
D. albinism

24. Which one of the following is NOT a biological function of courtship?

A. Enables closely related species to distinguish each other
B. Establishes pecking order between individuals
C. Helps to ensure that the two animals involved are ready for mating
D. Acts as a stimulus to operate internal control mechanism

25. During water stress in plants, photosynthesis reduces mainly due to shortage of

A. water
B. carbon dioxide
C. mineral salts
D. oxygen

26. An animal has a radial symmetry, a diploblastic body wall and a sac-like body with only one opening that is surrounded by tentacles. The animal is most likely to be

A. an annelid
B. a mollusk
C. a cnidarian
D. a nematode

27. The gene for albinism is also is also responsible light skin colour, pink eyes and brown hair. This is an illustration of

A. codominance B. pleiotropy
C. Epistasis D. Linkage

28. Which of the following pairs below show a synergistic interaction?

A. Auxins and Gibberellins B. Ethene and Cytokinin
C. Abscisic acid and Cytokinin D. Ethene and Abscisic acid

29. The importance of a long refractory period in cardiac muscle is to protect it from

A. over contracting B. developing tetanus
C. developing an oxygen debt
D. pumping too much blood to the tissue

30. The position of an organism within a pecking order usually depends on the following except.

A. size of the animal B. fitness of the animal
C. genetic vigor of the animal D. aggressiveness

31. Which one of the following is a physiological adaptation of terrestrial plants to minimize water loss?

A. Leaf orientation B. Folding of plant leaves
C. Periodic shedding of leaves D. Change of stomata rhythm

32. A person's blood group is type B. This means that her (or his)

A. blood plasma contains antigen B only
B. blood plasma contains only anti body **a**
C. red blood cells possess antibody **b** only
D. red blood cells possess antigen A only

33. Given that the loci of a particular pair of linked autosomal gene are very close to each other. Which one of the following is the expected resultant phenotypic ratio of a cross two double heterozygous parents?

A. 1 : 1 B 3 : 1 C. 1 : 1 : 1 : 1 D. 9 : 3 : 3 : 1

34. Which one of the following would require complete blood transfusion to an infant whose blood cells have been destroyed?

A. Father Rh^-, Mother Rh^-, Infant Rh^-
B. Father Rh^+, Mother Rh^-, Infant Rh^+
C. Father Rh^+, Mother Rh^+, Infant Rh^-
D. Father Rh^+, Mother Rh^+, Infant Rh^+

35. Which one of the following influences the rate at which the mammal expends energy?

A. Liver
B. Hypothalamus
C. Thyroid
D. Adrenal cortex

36. The urine that flows out of the collecting duct has its osmotic concentration nearest to that of the

A. cortex region
B. medulla region
C. distal convoluted tubule
D. Proximal convoluted tubule

37. Which one of the following is most likely to lead to polymorphism in a population?

A. Artificial selection
B. Disruptive selection
C. Stabilizing selection
D. Direction selection

38. When using the capture mark recapture method, the following factors must be considered except:

A. release of animals in their inactive period
B. scatter points of release throughout the habitat
C. do not release near any danger
D. releasing process should not damage the organisms in any way.

39. Which one of the following is not an advantage gained from innate evolutionary behavior?

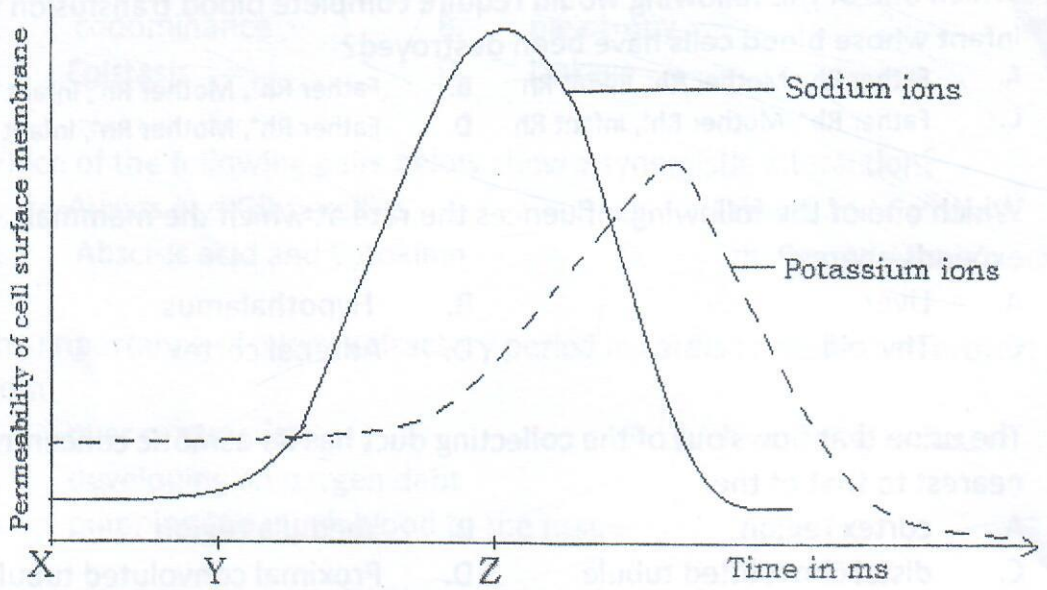
A. Longevity of the organism
B. Survivorship of the organism
C. learning by the organism
D. Biological fitness of the organism.

40. Transfer RNA (t-RNA) molecules are specific in that

A. they are smaller than mRNA molecules
B. each participates in synthesis of only one polypeptide chain
C. each can reorganize one particular kind of amino acid
D. each is activated by a specific enzyme.

Section B (60 marks)

41. The figure below shows the changes in permeability of the cell surface membrane of an axon to sodium and potassium ions.



a) Explain the permeability of the cell surface membrane to

(i) sodium and potassium ions during the period X to Y. *(2 marks)*

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(ii) sodium ions during the period Y to Z. *(3 marks)*

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b) Describe three functions of a sensory system. *(3 marks)*

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c) What are the advantages of conduction of messages through a chemical synapse? *(2 marks)*

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42. In ecology, lichens are described a symbiont pioneer indicator species.

(a) Explain why lichens are referred to as

(i) indicator species *(3 marks)*

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(ii) symbionts *(3 marks)*

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(b) Lichens form a pioneer community of the primary ecological succession. Explain its suitability for this. *(4marks)*

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43. a) (i) Distinguish between positive feedback and negative feedback in homeostasis. (2 marks)

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(ii) What are the features of an efficient homeostatic system? (2 marks)

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(b) (i) Describe the events that lead to the rise in the level of insulin in blood. (3 marks)

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(ii) What would be the effect of such rise in insulin level in an individual with an efficient homoeostatic system? (3 marks)

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44. (a) (i) What is genetic variation? *(1mark)*

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(ii) Identical twins share the same genotype. Explain the circumstances under which, and the aspects in which such twins may show some variations. *(2 marks)*

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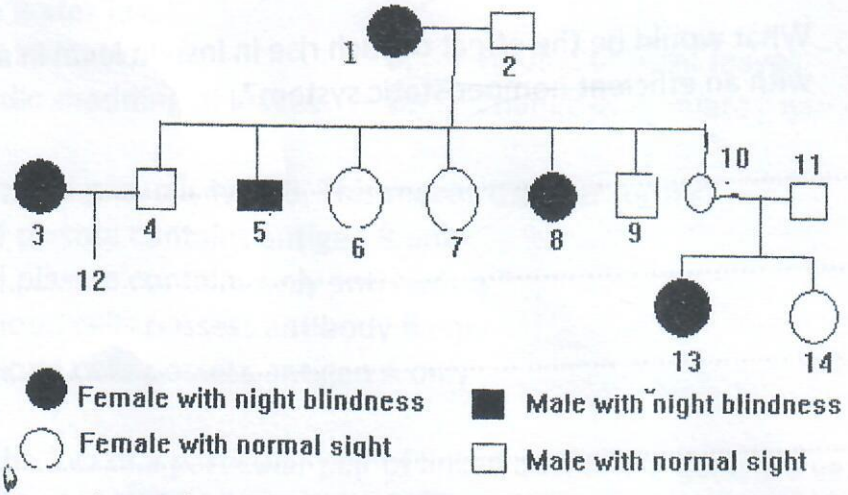
(b) Night blind - people have difficulty seeing in dim light. The allele for night blindness, **n**, is recessive to the allele for normal vision, **N**. These alleles are autosomal. The diagram shows part of a family tree showing inheritance of night blindness.



(i) What evidence from the above diagram confirms that night blindness is not a sex-linked condition? *(1mark)*

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(ii) What is the most likely genotype of individual No. 11? Support your answer with a reason.
Genotype *(2marks)*

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Reasons:

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(iii) Work out the probability that the next child born to individuals No.10 and 11 will be a girl with night blindness? *(3 marks)*

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(iv) Individual No. 12 is not a sufferer from night blindness. A cross between individuals No. 12 and No. 14 would represent a marriage between first cousins. With evidence from the above diagram, explain why a marriage between close relatives may be risky.
(2marks)

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45. a) Describe the roles played by each of the following in muscle contraction.

(i) ATP *(2 marks)*

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(ii) Calcium ions *(3marks)*

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b) How does the banding pattern change when the myofibril contracts? *(3 marks)*

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c) Describe two emergency stores of resources for muscle contraction. *(2 marks)*

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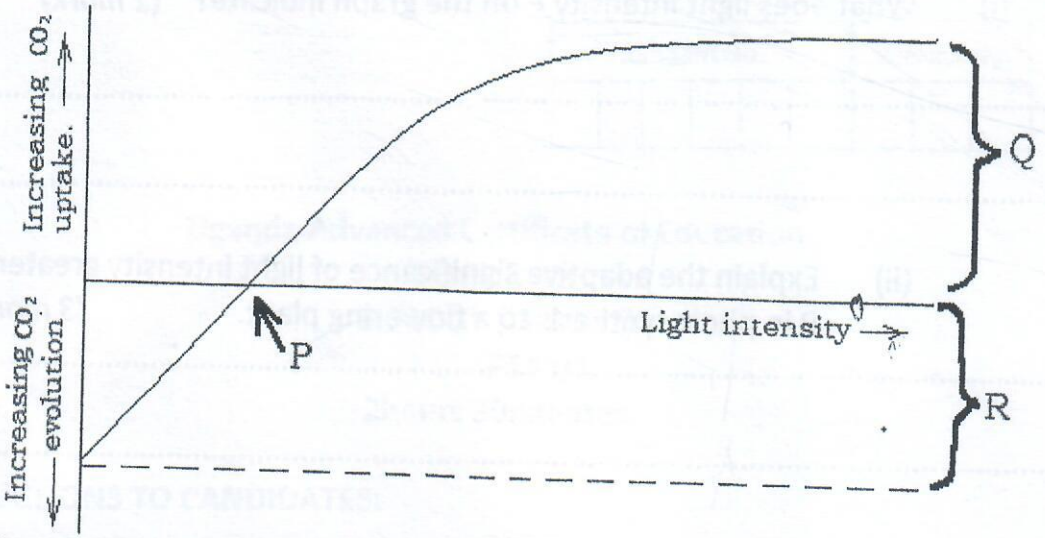
4**6** The figure below is a graph showing the variation the amount of carbon dioxide that moves in and out of the leaves with increasing light intensity.



(a) What is the physiological implication of the light intensity on the graph indicated by letters R and Q?

(i) region R *(2 marks)*

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(ii) region Q *(2 marks)*

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(b) (i) What does light intensity P on the graph indicate? *(1 mark)*

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(ii) Explain the adaptive significance of light intensity greater than P in photosynthesis to a flowering plant. *(3 marks)*

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c) State two physiological adaptation of sun plants to photosynthesis. *(2 marks)*

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END