NAME: ……

SCHOOL: …….

P530/1
BIOLOGY
PAPER 1
JULY/AUG 2024
2:30 HOURS

ASK INTEGRATED TEACHERS MOCK EXAMINATIONS BURREAU

AITEL JOINT MOCK EXAMINATIONS.

Uganda Advanced Certificate of Education

BIOLOGY

PAPER 1

2:30 HOURS

INSTRUCTIONS TO CANDIDATES

Answer all questions in both sections A and B

Answers to Section A questions must be written in the table provided

Answers to Section B should be written in spaces provided.

No additional sheets of paper should be inserted in this booklet.

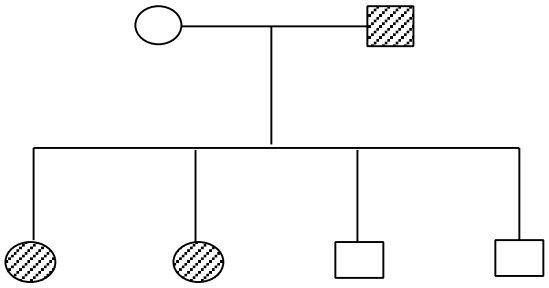
SECTION A ANSWERS									
1		9		17		25		33	
2		10		18		26		34	
3		11		19		27		35	
4		12		20		28		36	
5		13		21		29		37	
6		14		22		30		38	
7		15		23		31		39	
8		16		24		32		40	

SECTION A (40 MARKS)

Write the letter corresponding to the right answer in the table provided above. Each question in this section carries one mark.

1. The cell wall of Nitrosomonas is made up of;
   A. Capsule C. Cellulose
   B. Peptidoglycan D. Lignin
2. Which one of the following is not true about mitosis in plants?
   A. There is formation of asters
   B. No centrioles are involved
   C. Cell plates are formed
   D. Does not involve furrowing of the cytoplasm
3. Which one of the following is true about the mature metaxylem vessels?
   A. they are capable of stretching and growing
   B. they are living cells
   C. they are fully lignified and rigid
   D. they are formed before elongation is complete
4. A property of water that makes it a suitable component of a hydrostatic skeleton is its
   A. incompressibility C. low viscosity B. high density D. high surface tension
5. Which one of the following is not true about overuse of DDT?
   A. it reduces species diversity
   B. it reduces productivity at lower levels of the ecosystem
   C. it increases productivity at higher levels of the ecosystem.
   D. it can accumulate in organisms along the food chain
6. Which one of the following plastids is important in petals of insect-pollinated flowers?
   A. Amyloplasts C. Oleoplasts
   B. Chromoplasts D. Proteoplasts
7. Which one of the following amino acids commonly begins the chains of most proteins?
   A. Methionine C. Glutamine
   B. Glycine D. Glutamic acid

8. Which of the following phenotypic ratios would you expect in a mating of a female carrier of hemophilia and a normal male?
   A. All normal daughters all normal sons
   B. All normal daughters all sons with haemophilia
   C. All daughters with haemophilia all normal sons
   D. All normal daughters half normal sons
9. Which one of the following conversions of the Krebs cycle leads to direct formation of ATP without electron carrier system?
   A. Pyruvic acid to AcetylcoA
   B. Oxoglutaric acid to succinylcoA
   C. SuccinylcoA to succinic acid
   D. Succinic acid to fumaric acid
10. Which one of these combinations of phyla contains the most advanced organisms?
   A. Tracheophyta and Echinodermata C. Chordata and Cnidaria
   B. Tracheophyta and Chordata D. Tracheophyta and Annelida
11. The pedigree in the figure below shows the inheritance of deafness in a family. Circles represent females, squares represent males and shaded symbols show presence of deafness.



   This shows that deafness is due to a gene that is;
   A. Lethal and recessive C. Sex linked dominant
   B. Recessive autosomal D. Sex linked recessive
12. During human embryo development the mesoderm gives rise to the following except;
   A. Tendons C. Vertebra
   B. Liver D. Dermis
13. Which of the following processes occurs in the cytoplasm of the mesophyll cells?
   A. Fixation of carbondioxide by RUBP
   B. Fixation of carbondioxide by PEP

C. Decarboxylation of malate

D. Formation of phosphoglycerate

14. If oxygen is unavailable the electron transport system cannot work mainly because

A. There will be no ATP for electron transport

B. Reduced NAD and FAD cannot be oxidised

C. Hydrogen cannot be split to release electrons

D. Oxidised NAD and FAD cannot be reduced

15. Which one of the following has a general formula $C_nH_{2n}O_2$?

A. Stearic acid C. Linolenic acid

B. Oleic acid D. Linoleic acid

16. Lethal dose 50 (LD_{50}) refers to;

A. the single dose when administered to the pests, orally, can kill half of the experimental population

B. The dose when administered to the pests, can clear 50 members of the population

C. the dose when administered to the pests, can accumulate in 50% of the targeted organisms

D. this is a highly toxic dose of the pesticides, that it can kill 50% of the targeted and 50% of non-targeted organisms

17. Which of the following protein structure is not established using disulphide bridges?

A. Primary C. Tertiary

B. Secondary D. Quaternary

18. The term aneuploidy refers to a cell with

A. One or a few extra or missing chromosomes

B. More than two sets of homologous chromosomes

C. A single haploid set of chromosomes

D. Two sets of homologous chromosomes

19. Which 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 to move during ventilation

B. Oxygen diffuses faster through air than it does through water

C. The 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

20. The difference between cofactors and coenzymes is that coenzymes A. are proteins while cofactors are not.
    B. Are not proteins while cofactors are.
    C. are organic molecules cofactors are generally inorganic
    D. activate enzymes while cofactors activate coenzymes
21. A probable function of the endoplasmic reticulum is to
    A. Control the entry and exit materials in cells
    B. Facilitate intracellular transport of materials
    C. Act as a template in protein synthesis
    D. Enable substance diffuse against concentration gradient
    E.
22. Viruses are not considered real organisms because they
    A. Lack usable genetic information
    B. Are not capable of sexual reproduction
    C. Do not have their own mechanisms for exchanging matter and energy with the environment
    D. Are not capable of evolution
23. Which of the following would increase the rate of photosynthesis of a plant in where light was the limiting factor
    A. Increase the carbon dioxide concentration
    B. Increase the temperature
    C. Reducing the distance between the plant and light source
    D. Increasing the distance between the plant and light source
24. Which of the following is normally the longest lived reservoir for carbon?
    A. Atmospheric carbon dioxide C. Petroleum
    B. Marine plankton D. Wood
25. Amylopectin is formed from amylose by a plant cell detaching short lengths of an amylose chain and reattaching them as branches. Which bonds are broken and which are formed when amylose is converted into amylopectin?

	Bonds broken	**Bonds formed**
A	α 1,6	α 1,6
B	α 1,6	α 1,4

C	α 1,4	α 1,6
D	α 1,4	α 1,4

26. 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
27. 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 vaporization

28. Which of the following is NOT a characteristic of the plasma membrane?
    A. It is selectively permeable
    B. Cholesterol helps to maintain membrane fluidity at low temperatures
    C. It is composed of phospholipid bilayer
    D. Peripheral proteins enable facilitated diffusion

29. The table below shows how many individuals were recorded for each of five species in five separate communities. Which community has the highest species diversity?

Community	**Species**				
	1	**2**	**3**	**4**	**5**
A	90	10	0	0	0
B	80	10	10	0	0
C	25	25	25	25	25
D	20	20	20	20	20

30. 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
31. 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.
32. An absolute limit imposed by the environment on population increase is called
    A. Biotic potential C. Carrying capacity
    B. Mortality D. Environmental resistance
33. 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
34. The goblet cells are normally supported by:
    A. Squamous epithelium C. Cilia
    B. Stratified epithelium D. Columnar epithelium
35. Energy can be stored in the body in different ways. Glucose and glycogen yield approximately 17KJ of energy per gram while lipids yield 37KJ per gram. If the average person has stored 5g of free glucose in their blood, 480g total glycogen in their muscles and liver, 15Kg of lipids in their adipose tissue and has a daily energy requirement of 8700KJ per day. Approximately how many days could they theoretically survive under starvation?
    A. 65 days C. 55 days
    B. 35 days D. 45 days
36. In estimating the population of an area of 1000m2 a 1m2 quadrat was thrown 50 times and the total number of weeds counted were 60. What was the estimated population of the weed?
37.
    A. 20 C. 833
    B. 300 D. 1,200

38. Which of the following locations consists of hyaline cartilage?

A. Intervertebral discs C. Ends of long bones

B. Pinna of ear D. Nose

39. 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

40. Which feature shows that a substance is transported by facilitated diffusion rather than active transport?

A. Respiratory inhibitors affect the rate of transport

B. The substance is transported against the concentration gradient

C. The transport protein involved has a specific binding site for the substance

D. Transport across the membrane uses a membrane channel protein

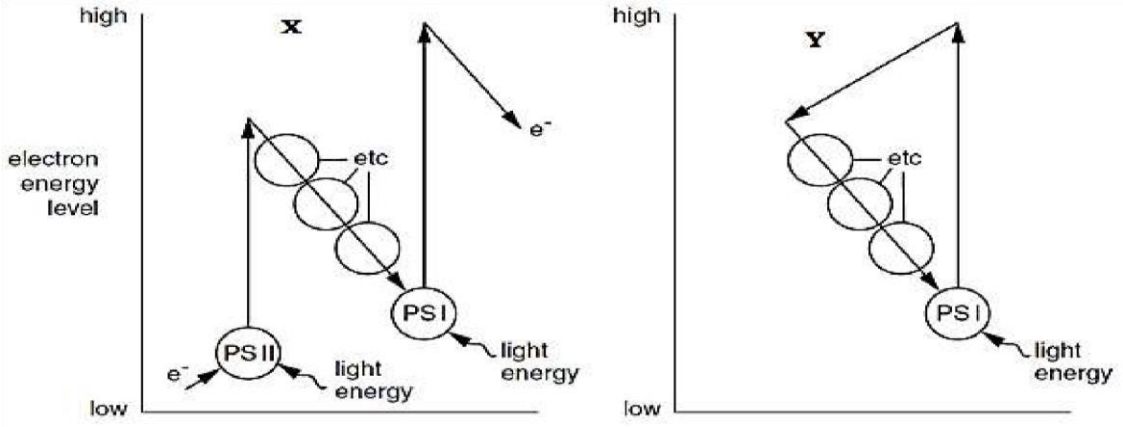
41. The volume and surface area of four animals A, B, C and D are shown in the following table: Which of the organisms would most need a specialized respiratory system?

Animals	**Volume cm^3**	**Surface area cm^2**
A	1	6
B	8	24
C	64	96
D	64	28

SECTION B (60 MARKS)

Write answers in the spaces provided.

42. Figure below shows the flow of electrons in photophosphorylation during light dependent stage of photosynthesis.



(a) State the precise location of photophosphorylation in the chloroplast. (**01 mark**)

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(b) Giving one reason in each case, identify the type of photophosphorylation labeled X and Y. (**03marks**)

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(c) Describe the role of light in photophosphorylation. (**02 marks**)

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(d) Give four differences between photophosphorylation and oxidative phosphorylation. (**04 marks**)

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43. a) State the parameters listed in Fick's law of diffusion (**03 marks**)

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b) Explain how each parameter in Fick's law of diffusion is reflected in the structure of the mammalian lung (**03 marks**)

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c) Explain the changes in oxygen delivery to the tissues that occur as a person proceeds from a resting state to intense exercise (**04 marks**)

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

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

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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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44. (a) Explain briefly some of the problems which may arise from excessive use of chemicals to control pests of crop plants. (**04 marks**)

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(b) Biological pest control avoids some of the problems of chemical control.

(i) Explain what is meant by the term biological pest control. (**01 mark**)

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(ii) Suggest one of the possible risks of biological pest control.(**01 mark**)

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(c) (i) Explain how the release of chlorofluorocarbons (CFCs) into the atmosphere can damage ecosystems. (**02 marks**)

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(ii) Explain the effect of thermal pollution on life in a water body? (**02 marks**)

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45. Briefly explain how the following tissues are suited to perform their Functions.

(i) Squamous epithelium (**02 marks**)

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(ii) Collenchyma (**03 marks**)

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(iii) Transitional epithelium (**02 marks**)

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(iv) Xylem (**04 marks**)

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46. In cats, males are XY and females are XX. A gene on the X chromosome controls fur colour in cats. The allele **G** codes for ginger fur and the allele **B** codes for black fur. These alleles are codominant. Heterozygous females have ginger and black patches of fur and their phenotype is described as tortoiseshell.

(a) Explain what is meant by codominant alleles. (**01 mark**)

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(b) (i) Explain why male cats with a tortoiseshell phenotype do not usually occur? (**02 marks**)

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(ii) A tortoiseshell female was crossed with a black male. Use a genetic diagram to show all the possible genotypes and the ratio of phenotypes expected in the offspring of this cross. (**03 marks**)

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(c) Polydactyl in cats is an inherited condition in which cats have extra toes. The allele for polydactyl is dominant.

(i) In a population, 19% of cats had extra toes. Calculate the frequency of the recessive allele for this gene in this population. Show your working.
(**02 marks**)

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(ii) Some cat breeders select for polydactyly. Describe how this would affect the frequencies of the homozygous genotypes for this gene in their breeding populations over time. (**02 marks**)

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END