Name: ---------- Centre/Index No----------

Name of school ---------- Signature: ----------

P530/1
BIOLOGY
(THEORY PAPER)
Paper 1
July/August 2009
2½ Hours

WAKISSHA JOINT MOCK EXAMINATIONS
Uganda Advanced Certificate of Education
BIOLOGY
Paper 1
2 hours 30 minutes

INSTRUCTIONS

- *Answer ALL questions in both sections A and B*
- ***Section A :*** *Answers to this section **must** be put in the boxes provided on the Left side of each question*
- ***Section B :*** *Answers to this section should be written in the spaces provided **only** not anywhere else. No additional sheet(s) of paper should be inserted in this booklet.*

FOR EXAMINER'S USE ONLY	
Section	Marks
Section A : 1 - 40	
Section B : 41	
42	
43	
44	
45	
46	
Total	

SECTION A (40MARKS)

1. Which one of these makes an active cell get more oxygen than an inactive cell from oxyhaemoglobin? The active cell has ;

   A. Low oxygen tension
   B. Low Carbondioxide tension
   C. High oxygen tension
   D. High Carbondioxide tension.

2. Which of the following stages occur during which the bicuspid and tricuspid valves are closed?

   A. Ventricular systole
   B. Atrial systole
   C. Ventricular systole
   D. Late joint diastole

3. Which one of the following is a function of the T-helper cell in body defence?

   A. Kills the antibodies
   B. Stimulates B cells to mature
   C. Kill the antigen
   D. Suppress B- cells

4. Which one of the following biological processes does NOT utilize respiratory energy?

   A. Absorption of mineral salts
   B. Synthesis of mineral salts
   C. Loss of water vapour from stomata
   D. Meiosis

5. Saltatory conduction occurs in

A. Thin nerve fibres

B. myelinated fibres

C. thick nerve fibres

D. non-myelinated fibres.

6. During single circulation in insects, blood,

A. flows within the heart posteriorly

B. leaves and re-enters the heart via ostia

C. leaves the heart through the ostia

D. re-enters the heart through the ostia.

7. A chemical stains nuclei red. Which one of the following would stain deepest red?

A. Tracheids

B. Cambium

C. Collenchyma

D. Parenchyma

8. The potentiality for the replication of DNA depend on

A. Hydrogen bonds, between the bases

B. High energy bonds between phosphates

C. Covalent bonds between bases

D. High molecular weights

9. Which of these occurs in cellular respiration when the chemical bonds break and release energy in step wise oxidation?

A. Temperature rises

B. Enzymes are involved

C. Energy is dissipated as heat

D. Light is produced.

10. Which one of the following components are necessary for blood clotting at a ruptured vessel?

A. Calcium ions, fibrin, vitamins, serum

B. Calcium, ions, thrombin, platelets, vitamin E

C. Thromboplastin, calcium ions, thrombin, vitamin K

D. Thromboplastin, calcium ions, thrombin, vitamin E

11. The initial absorption of water by a germinating seed cotyledon and endosperm is caused by;

A. Osmostically active substances in endosperm and cotyledons.

B. Imbibition pressure due to colloidal particles in the seed.

C. Active absorption involving expenditure of energy.

D. Mass flow through the micropyle

12. Which one of the organisms below has metameric segmentation?

A. Earth worm

B. Round worm

C. Tape worm

D. Star fish

13. Haemophilia is caused by a recessive gene (h) and is sex-linked, occurring commonly in males. If a hameophilic has a carrier wife, what would be the probability of having haemophilic daughter in the family?

A. 0%

B. 25%

C. 50%

D. 75%

14. Which of these stages have the main differences between mitosis and meiosis?

A. Metaphase I and prophase I

B. Prophase I and metaphase II

C. Metaphase II and Prophase II

D. Metaphase I and Prophase II

15. The role of Ca^{2+} in the process of muscle contraction is to.

A. cause depolarization of T-tubule system

B. Change the configuration of Troponin, thus exposing myosin binding sites.

C. bind to tropomyosin and break actin-myosin cross bridges

D. Change the configuration of myosin heads thus causing microfilaments to slide over each other.

16. Which one of these explains the slow movements of blood through capillaries?

A. Lots of blood volume is lost from the capillaries

B. The pressure in venules is high

C. The cross-sectional area of capillaries is larger than that of arterioles.

D. The osmotic pressure in capillaries is very high.

17. Which of the following structures in the nephrone is responsible for the variation in the rate of urine production in mammals? The

A. glomerulus

B. Bowmans capsule

C. loop of Henle

D. Collecting duct

18. Which one of the following is likely to be **TRUE** for groups of mammals dispersed in a regular pattern?

i) increased risk of predation

ii) less exposure to diseases and parasites

iii) poor access to mates

iv) increased territorial behaviour

A. i, ii and iii

B. ii, iii and iv

C. i, iii and iv

D. ii and iii only.

19 Which of the following stages in the life cycle of the plasmodium is responsible for the rapid body temperature rise in malaria patients?

A. Formation of sporozoites from zygotes

B. Formation of merozoites from sporozoites

C. Formation of gametocytes from gametocytes

D. Development of zygotes from gametocytes

20. In which sub stage of prophase I of meiosis does synapsis appear first?

A. Leptotene

B. Zygotene

C. Pachytene

D. Diplotene

21. Which of the following honey bee castes feed on the same diet throughout their life cycle?

A. Both drones and workers

B. Drones only.

C. Queens only

D. Workers only.

22. When formulating his theory of evolution, Darwin considered each of the following except.

A. Genetic theory

B. Morphology of living organisms

C. The geographical distribution of organisms

D. The structure of the fossils

23. What would be the code of the anti-codon on tRNA that binds with mRNA whose DNA template was AGT?

A. AGT

B. AGU

C. UCA

D. TCA

24. Which of these is NOT a likely result of polyploidy in plants?

A. Increased hardness

B. Resistance to diseases

C. Decreased hybrid vigour

D. Formation of seedless large fruits.

25. A generative nucleus in a pollen grain serves to;

A. Fuse with the egg cell to form a zygote.

B. Control the growth of the pollen tube.

C. Produce two male Nuclei

D. Fuse with the polar nuclei to form the triple endosperm nucleus.

26. A person who walks unsteadily may have a defect in the .....

A. Cerebrum

B. Medulla oblongata

C. Hypothalamus

D. Cerebellum

27. The fluid which flows into the duodenum from the pancreas via the pancreatic duct has a composition of;

A. Amylase, peptidase, rennin, trypsinogon

B. Lipase, amylase, pepsinogen, maltose

C. Amylase, trypsin, pepsin, peptidase

D. Lipase, trypsinogen, peptidase, amylase.

28. In which one of the following parts of the cell does the least production of ATP occur? In the ;

A. Cytoplasm
B. Matrix of mitochondrion
C. Cristae of mitochondrion
D. Outer membrane of mitochondrion

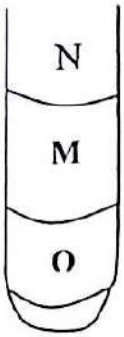
29. Which one of the following nitrogen bases has two rings in their structure?

A. Cytosine and Thymine
B. Cytosine and Adenine
C. Adenine and Guanine
D. Adenine and Thymine

30. In which phases in Oogenesis are the products diploid?

A. Maturation and multiplication phases
B. Growth and multiplication phases
C. Maturation and growth phases
D. Multiplication and differentiation phase.

31. The figure shows a longitudinal section of a shoot apex.



Which is the main activity taking place in region N?

A. Cell elongation
B. Meiotic cell division
C. Differentiation
D. Mitotic cell division

32. The perfect detection of the adjustment in the lateral edges of vision is as a result of;

A. Simple eyes
B. Cones only
C. Rods only
D. Compound eyes.

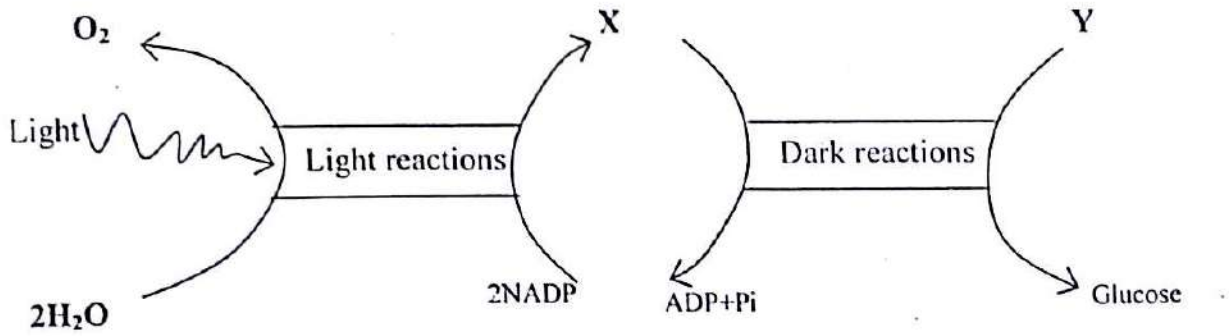
33. Secretions from B-cells of islets of langerhans lead to the following EXCEPT:-

A. Increased ATP synthesis
B. Suppresses blood sugar
C. Lead to nervous stimulation and muscle activity
D. It leads to diabetes melitus during hypo-secretion

34. Which of the following is NOT true about Rough Endoplasmic Reticulum?

A. It stores proteins which have been produced by ribosomes
B. The ribosomes are permanently attached to it.
C. It is continuous from the nuclear membrane
D. It is an intercellular system with flattened cavity.

The figure below shows a summary of the dark and light stages of photosynthesis. Use it to answer questions 35 and 36.



35. The products of the light reaction, labeled X, are:-

A. $NADPH_2$ and ATP

B. $NADPH_2$, Oxygen and ATP

C. NADP and Oxygen

D. ATP and Oxygen

36. The substance Y in-corporated into the dark reaction is:-

A. RuBP

B. PEP

C. Carbon dioxide

D. ATP

37. Which of the following is a behavioural method of controlling birth?

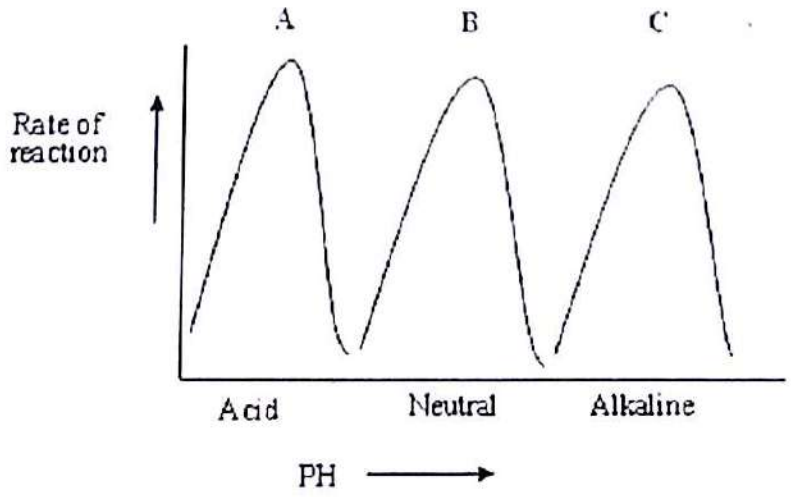
A. Abortion

B. Various Intra-Uterine devices

C. Rhythmic Method

D. Sterilization of the males or females

38. In the figure below, the curves represent the rate of enzymes – controlled reactions for three different enzymes A, B and C.



Which of the following statements can be regarded as the MOST correct conclusion about the effect of pH on enzyme activity?

A. The rate of action of enzymes decreases with pH
B. Enzymes work best within a narrow range of pH which is different for different enzymes.
C. Enzymes work best in alkaline conditions
D. Enzymes are active in a particular pH only.

39. Which of the following does NOT happen in non-cyclic electron transport?

A. Oxygen gas is released
B. ATP and $NADPH_2$ are formed
C. Water donates electrons and protons
D. ATP and $NADH_2$ are formed.

40. In the mammalian menstrual cycle, the decline in the level of progesterone is due to;

A. Successful conception
B. Formation of corpus Luteum
C. Degeneration of corpus Luteum
D. Maturation of Grafian follicle.

SECTION B (60 MARKS)

41) a) State Mendel's first law of inheritance (02 marks)

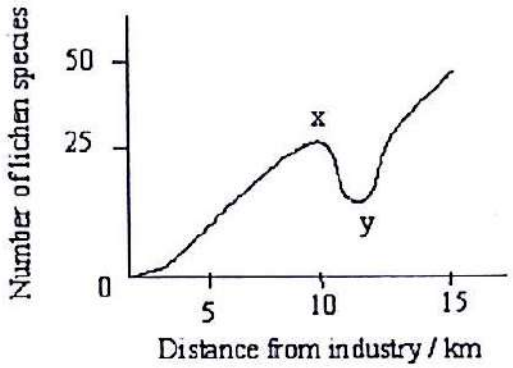
b) Manx Cats do not have tails. When a manx cat is mated with a normal long tailed cat, approximately half of the offsprings are long tailed and approximately half are manx. When two manx cats are mated the ratio of offsprings is 2manx to 1 long tailed cat.

i) What does this suggest about the inheritance of the manx condition in cats? (03marks)

ii) Show by means of a cross, the inheritance of manx condition when two manx cats are mated. (05marks)

42. a) Define Indicator Species (01 mark)

b) Figure below shows number of Lichen species growing along a 20Km transect from an industry.



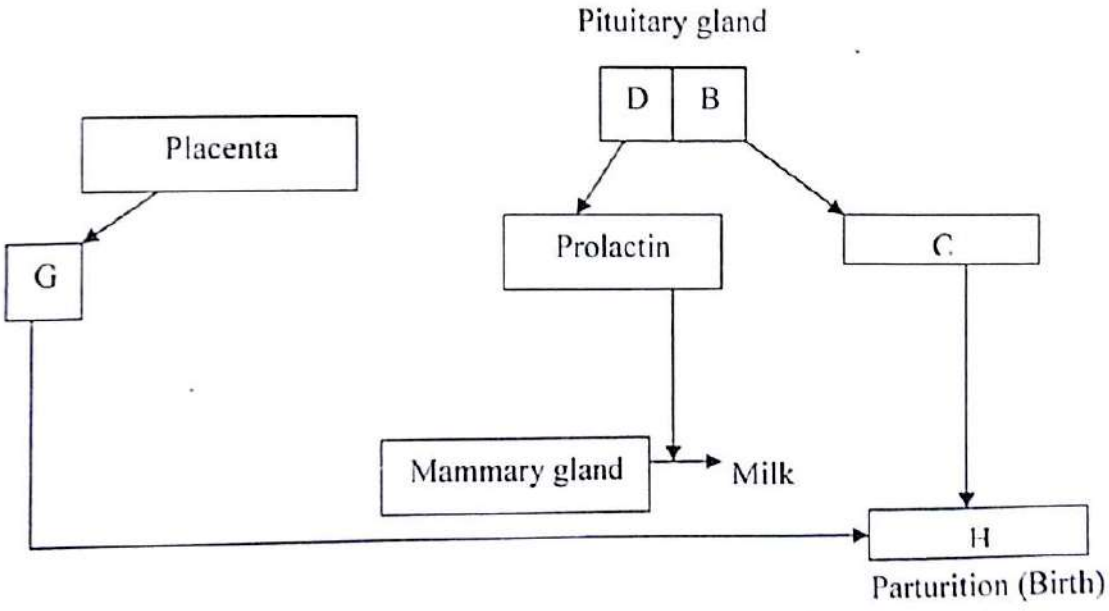
i) Comment on the trend of the graph up to 10km from the Industry. (02marks)

ii) Explain the trend of the graph in b(i) above. (03marks)

iii) Suggest two possible reasons for the trend of the graph between X and Y.
(02marks)

c) State two strategies a developing country can design to ensure conservation of natural resources. (02marks)

43. The illustration below shows the action of the female hormones during pregnancy. Study it and answer the questions that follow:-



a) Identify the portions of the pituitary gland labelled D and B. (02 marks)

i) D_____

ii) B_____

b) Name a hormone, C in the diagram above. (01mark)

_____

c) What is the role of hormone C mentioned in (b) above (02 marks)

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d) Name the hormone, G and structure H (02 marks)

i) G_____

ii) H_____

e) Give the two (2) roles of hormone G and one (1) role of structure H. (03 marks)

i) G_____

_____

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_____

ii) H_____

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44. a) Explain the role of Sodium ions in maintaining high water potential of blood.
(4 marks)

b) Give reasons for the following observations, in a human being:-

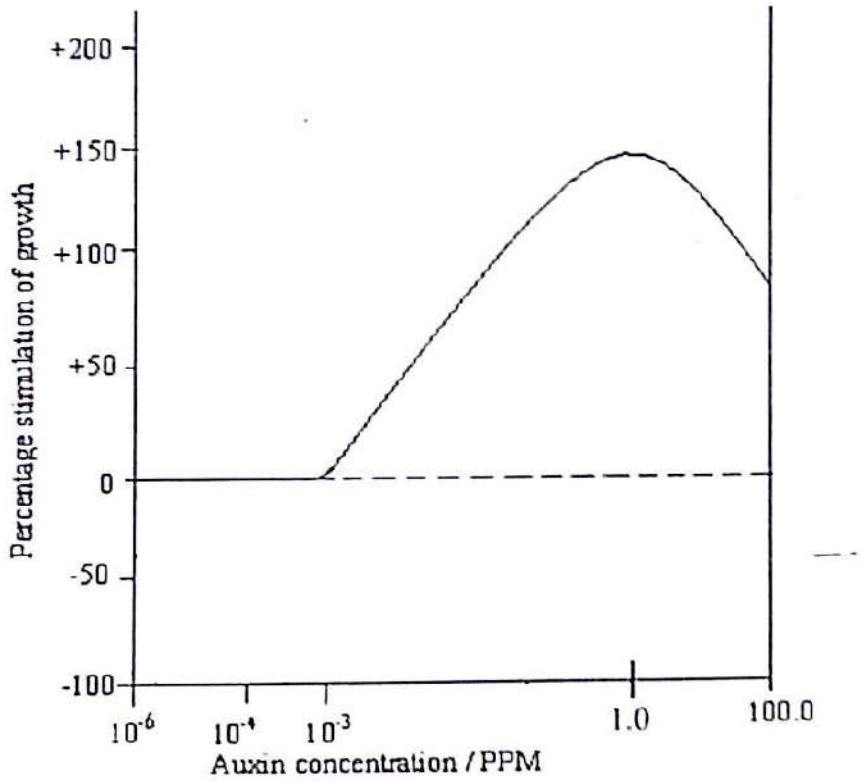
i) Urination almost stops during excessive bleeding. (02 marks)

ii) Individual passes out Urine that changes yellow if boiled with benedicts solution.
(02marks)

c) Give **two** structural mechanisms employed by fresh water fish to solve **the** problem of osmoregulation. (02 marks)

45. a) Distinguish between tropic response and nastic responses. (02 marks)

b) The figure below shows the effect on growth of applying different concentrations of auxins to the shoot of bean seedlings expressed as a percentage stimulation of growth.

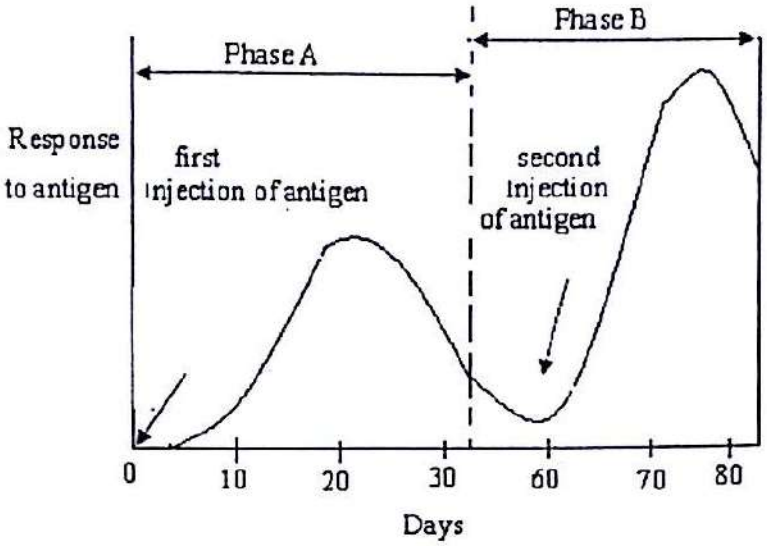


i) On the figure above, include a curve to show the effect on root growth of the same auxin concentration if applied to the roots of the same seedlings.
(01mark)

ii) What do the positive and negative values on the vertical axis of the graph above mean? (01mark)

c) Explain the effect of auxin concentration on shoot growth, reflected by the curve above. (06 marks)

46. The graph shows the response of an individual to an initial and later dose of antigen. Study it and answer the questions that follow:-



a) Name the type of response shown in

i) Phase A_____

ii) Phase B_____

b) State two differences observed in the graph between the responses in A and B.

(02marks)

_____

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_____

_____

c) What advantage does response B create to the body as compared to response A? (03 marks)

d) Explain the importance of response in phase A to the body of a human being. (04 marks)

END

Name..... Centre/Index No. .....

Name of School ..... Signature.....

P530/1
BIOLOGY
(Theory Paper)
PAPER 1
July/August 2011
$2^1/_2$ hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Advanced Certificate of Education

BIOLOGY

Paper 1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

- Answer **all** questions in both sections A and B
- Section A: Answers to this section must be written in boxes provided on the left side of each question.
- Section B: Answers to this section should be written in the spaces provided only NOT anywhere else.
  No additional sheet(s) of paper should be inserted in this booklet.

FOR EXAMINERS' USE ONLY			
SECTION		**MARKS**	**INITIALS**
Section A:	1-40		
Section B:	41		
	42		
	43		
	44		
	45		
	46		
TOTAL			

Turn Over

SECTION A (40 MARKS)

Write the letter to the correct answer in the corresponding box provided.

1. Facilitated diffusion and active transport both require...
   A. Adenosine triphosphate.
   B. Protein carriers.
   C. Unidirectional movement of solutes.
   D. That the solutes moved be soluble in lipids.

2. The substance which lowers the surface tension in alveoli to ease their flexing during ventilation movements of the chest is...
   A. Mucus.
   B. Tissue Fluid.
   C. Surfactant.
   D. Lymph.

3. Which of the following does not occur during cyclic photophosphorylation?
   A. Oxidation of chlorophyll.
   B. Production of NADH.
   C. Production of ATP.
   D. An election transport system.

4. The homeostatic reaction glycogen ⟶ glucose during stress is stimulated by the hormone...
   A. Insulin.
   B. Glucagon.
   C. Adrenalin.
   D. Thyroxin.

5. During support in flowering plants, the following forces are experienced **except**...
   A. Tension.
   B. Shear stress.
   C. Thrust.
   D. Compression.

6. Which of the following hereditary characteristics is known to be sex limited?
   A. Haemophilia.
   B. Baldness.
   C. Albinism.
   D. Colour - blindness.

7. Which of the following does **not** play part in regulating the salt concentration of mammalian blood?
   A. Kidney.
   B. Skin.
   C. Liver.
   D. Pituitary gland.

8. Viruses can **not** reproduce outside a living cell because...
   A. Not all of them contain DNA.
   B. They are too small to reproduce.
   C. They are unable to synthesize their own DNA.
   D. they are unable to absorb raw materials from the surroundings.

9. In order to survive in the sea, a marine bony fish
A. loses water by osmosis and absorbs salts.
B. swallows water and absorbs salts.
C. swallows water and extrudes salts.
D. gains water by osmosis and extrudes salts.

10. Which of the following mineral elements is **not** required by plants?
A. Copper.
B. Iron.
C. Iodine.
D. Zinc.

11. Monosomy and Trisomy are genetic abnormalities that usually arise due to…
A. Polyploidy.
B. Crossing over.
C. Non-disjunction.
D. Lack of cytokinesis.

12. Sensitivity of the uterus to oxytocin is increased in a human female by a hormone.
A. Progesterone.
B. Oestrogen.
C. Prolactin.
D. Luteinizing hormone.

13. Development of a seed from an unfertilized egg is…
A. Vivipary.
B. Apogamy.
C. Apospory.
D. Parthenocarpy.

14. Which of the following is the function of helper T- cell in the immune response?
A. Activates B Cells.
B. Kills the antibodies.
C. Kills the antigens.
D. Suppresses B cells.

15. Haemolytic disease of the new born usually occurs when…
A. Rh^- mother bears Rh^+ foetus.
B. Rh+ mother bears Rh^- foetus
C. O^+ mother bears A^+ foetus.
D. O^- mother bears A^- foetus.

16. The potentiality for the replication of DNA depends on…
A. Hydrogen bonds between the bases.
B. High energy bonds between phosphates groups.
C. Covalent bonds between bases.
D. High molecular weight.

17. Patients with diabetes mellitus have frequent urination and increased thirst because
A. Less water passes from the glomerulus to the Bowman's capsule.
B. More water is driven from the glomerulus to Bowman's capsule than normal.
C. More salt is reabsorbed at the proximal convoluted tubules.
D. Increased glucose in the urine increases its osmorality and less water is reabsorbed by blood.

18. Skeletal muscle contraction is normally triggered by release of neurotransmitter at a synapse that
A. causes high level of oxygen and sugar to be released by sarcolemma.
B. causes actin and myosin to slide past each other.
C. causes flow of calcium ions that attaches to actin filaments exposing the myosin binding sites.
D. causes flow of calcium ions that release ATP which then causes Actin filaments to slide past myosin filaments.

19. According to evolutionary history the first animals to evolve flight as a means of locomotion were…
A. Mammals.
B. Birds.
C. Insects.
D. Reptiles.

20. The pigment molecules of a chloroplast are located within the
A. Thylakoid membranes.
B. Inner membranes.
C. Intrathylakoid space.
C. Intermembranal space.

21. Some animals appear to spend time and energy helping others of their species. This type of behavior is…
A. Competition.
B. Mutualism.
C. Territoriality.
D. Altruism.

22. During meiotic cell division which of the following events occur during synapsis?
A. Random separation of homologous chromosomes.
B. Replication of DNA.
C. Mixing up of half the maternal and paternal chromosomes.
D. Pairing up of homologous chromosomes.

23. Fixed action patterns of behaviour are predictable stereotyped behavioural responses due to…
A. Habituation.
B. Imprinting.
C. Insight.
D. Innate behaviour.

24. Which of these **best** describes development?
A. Cells divide and become large.
B. Cells become specialized in structure and function.
C. Body parts are shaped and patterned into a specific form.
D. Organs and systems form.

25. In humans, the ability to taste the chemical PTC (phenyl Thiocarbamide) is inherited as a simple dominat characteristic.
Suppose 360 out of 1000 college students could not taste the chemical. What is the number of heterozygous students in the population?
A. 360
B. 240
C. 590
D. 480

26. Some species that appear to occupy the same niche are able to co-exist because of...
A. Habitat fragmentation.
B. Resource partitioning.
C. Tolerance.
D. Competition.

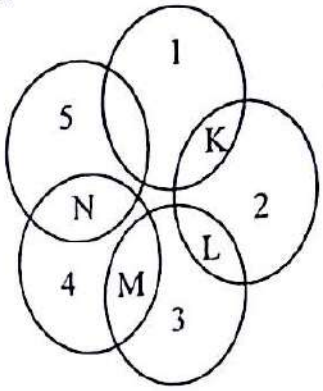
27. Which one of the following is the main form of photosynthetic product transported through the phloem?
A. Starch
B. Amino acids
C. Sucrose
D. Glucose

28. High carbondioxide concentration in respiring tissues is important because it causes
A. Local vasodilation, allowing more blood into the tissue.
B. Low PH in the tissues leading to unloading of oxygen.
C. Local vasoconstriction creating high blood pressure.
D. Increased heart beat.

29. Compared to carbohydrates, fats have higher energy value because fats.
A. Have long chains of fatty acids.
B. Are more compact in structure.
C. Have a higher proportion of carbon atoms.
D. Have a higher proportion of hydrogen atoms.

30. When a man is attacked by a pathogen that secretes antigens, his body secretes antibodies. This type of immunity is called...
A. Passive immunity.
B. Active immunity.
C. Short-lived immunity.
D. Artificial immunity.

31. The geographical distribution of four populations of certain species of organisms is shown in the diagram below



Fertile off springs are produced where the populations interbreed at areas K.L.M and not N. How many species are present?

A. 1
B. 2
C. 3
D. 4

32. Cells with important secretory functions have well developed…
A. Mitochondria
B. Lysosomes
C. Centrioles
D. Golgi body

33. The trophic level that has the least amount of energy is
A. Producer
B. Decomposer
C. Primary consumer
D. Secondary consumer

34. Which of the following human cells contains only non-homologons chromosomes?
A. Hepatocytes
B. Erythrocytes
C. Chondrocytes
D. Spermatozoa.

35. Which one of the following occurs when arterial pressure falls too much?
A. Stretch receptors are stimulated
B. cardiac output decreases
C. Peripheral blood vessels dilate
D. Stretch receptors are not stimulated.

36. Which of the following causes the closure of aortic valves during cardiac cycle in mammalian heart?
A. Filling of atria with blood.
B. Ventricular pressure rising above aortic pressure.
C. Ventricular pressure falling below aortic pressure.
D. Contraction of ventricles.

37. Gametes in gametophyte generation of a moss are formed by
A. Meiosis I.
B. Mitosis.
C. Meiosis II.
D. Meiosis I and II.

38. Which one of the following is **not** an essential force during flight in birds?
A. compressional force.
B. Sinking force.
C. Driving force.
D. Lift force.

39. A condition known as "Rigor mortis" usually results from...
A. Supply of enough ATP to the Skeletal muscle prior to death.
B. failure of the Actin-myosin bridges to form.
C. Short supply of ATP to skeletal muscles prior to death.
D. Shortage of tropomyosin and troponin protein molecules.

40. Which of the following sets of inner ear parts constitutes the "Organ of Corti"?
A. Oval window, Basilar membrane, auditory nerve.
B. Tectorial membrane, basilar membrane, sensory hair cells.
C. Round window, tectorial membrane, sensoy hair cells.
D. Tectorial membrane, middle canal, basilar membrane.

SECTION B (60 MARKS)

41. Figure I below shows the number of ant species recorded at different latitudes.

Fig 1.

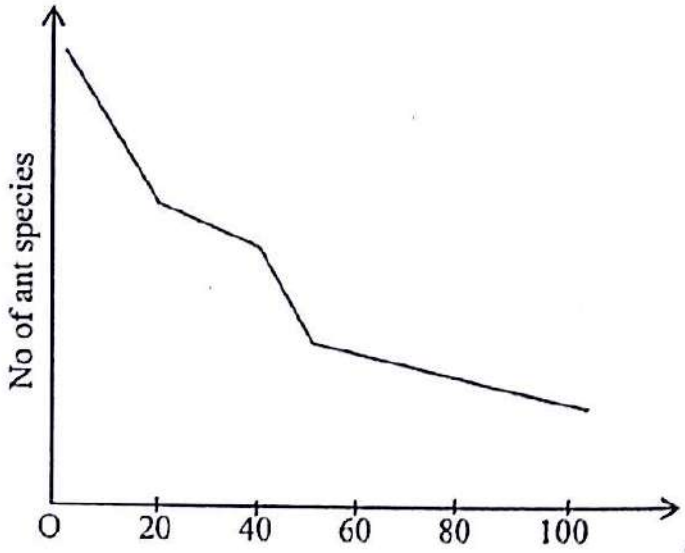


Figure 1

(a)(i) Describe the distribution of ant species as latitude changes. (02marks)

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(ii) Explain the distribution of ant species as latitude changes. (5 marks)

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(b) Give three major effects of loss of Biodiversity in a given area. (3 marks)

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42.(a) What is founder's effect? (1 ½marks)

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(b) Explain how founder's effect may lead to formation of a new species. (5 marks)

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(c) State how speciation in a given population may be prevented. (3 ½marks)

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43. Figure 2 below shows the metabolic rate and body temperature of a naked man subjected to a gradually lowering environmental temperature from 29^0C to $^-1^0$C in an experiment.

Fig 2.

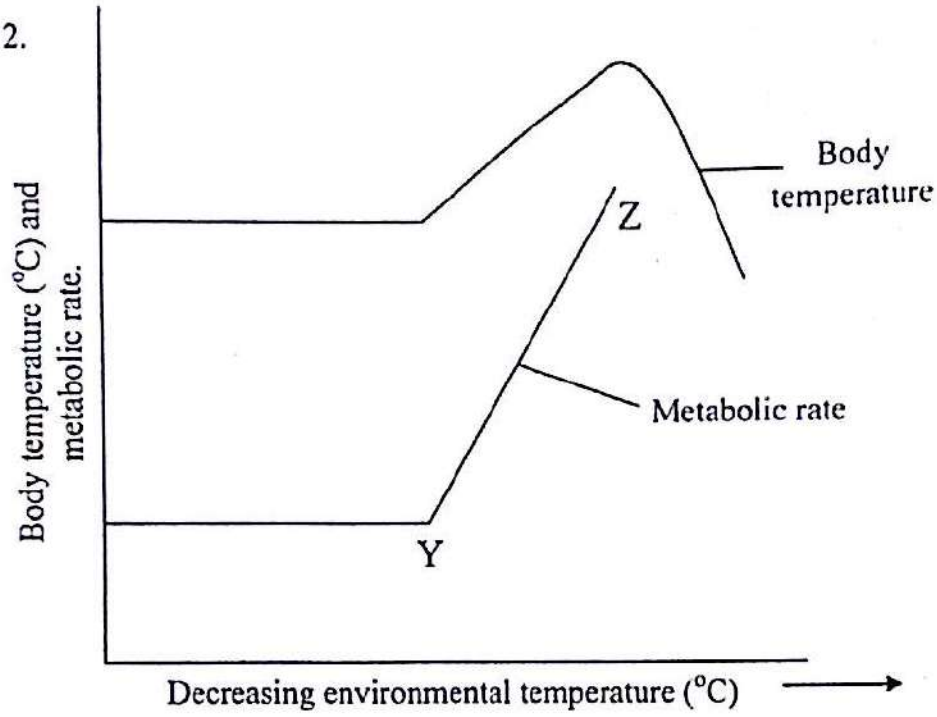

Figure 2

(a) What do points Y and Z represent in the figure above?

Y..... ($0^1/_2$ mark)

Z..... ($0^1/_2$ mark)

(b) Explain the effect of lowering environmental temperature in this experiment (5marks)

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(c) Why should body temperatures increase when malaria parasites invade the body? (4 marks).

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44. Figure 3 below shows degradation of an hexose sugar and generation of a triose sugar in a C_3 plant and in animal in presence and absence of oxygen.

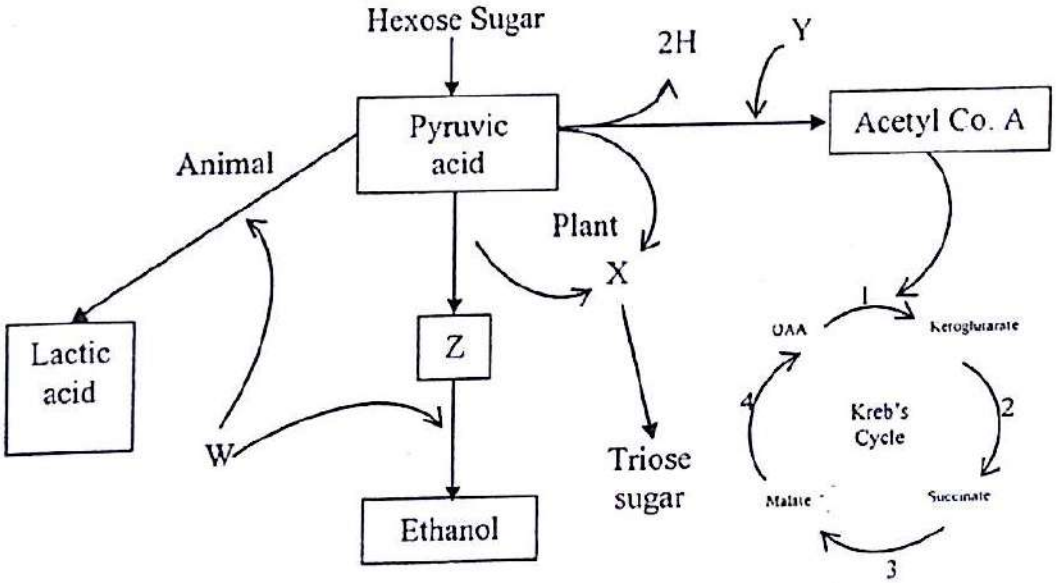

Figure 3

(a)(i) Name compounds represented by letters W, X, Y, Z.

(2 marks)

W.....

X.....

Y.....

Z.....

(ii) How do the reactions in stage 2 differ from those of stage 3? (2 marks)

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(iii) State the significance of stage 4 in energy production. (1marks)

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(b) What would happen if a poison is added at stage 3? (2 marks)

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(c) State how compound X is modified to form the second sugar (triose sugar) in the plants.

(3 marks)

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45. (a) Outline two structural differences between cartilage and spongy bone.

(2marks)

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(b) What advantages does having a well developed locomotory system confer to an organism? (4 marks)

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(c) State the changes that occurred in the first purely aquatic animals that enabled them colonize terrestrial habitats. (4 marks)

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46. Table 1 below shows control of digestion along the alimentary canal of a human being.

Table 1

Part of alimentary canal	Mechanism of controlling digestive juice secretion.
Mouth	Purely Nervous control
Stomach	Both Nervous and Hormonal control
Duodenum	Purely hormonal control.

(a) State the significance of the observed trend of control of secretion of digestive juice along the alimentary canal. (6 marks)

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(b) Give the role of hormones in stimulating the secretion of digestive juices in the duodenum (4 marks)

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END

Name..... Centre/Index No. .....

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P530/1
BIOLOGY
(Theory)
PAPER 1
July/August 2012
$2^{1}/_{2}$ hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Advanced Certificate of Education
BIOLOGY
(Theory)

Paper 1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

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' USE ONLY			
SECTION		MARKS	INITIALS
Section A:	1-40		
Section B:	41		
	42		
	43		
	44		
	45		
	46		
TOTAL			

SECTION A (40 MARKS)

1. An invagination of the cell surface membrane facilitates.

   A. Osmosis
   B. Diffusion
   C. Endocytosis
   D. Active transport

2. Evaporation of water from a body surface causes cooling because water has a high

   A. Latent heat of vapourisation
   B. Latent heat of fusion
   C. Boiling point
   D. Specific heat capacity.

3. Bryophytes and pteridophytes can not fully exploit terrestrial life because they

   A. Lack well developed vascular system
   B. Lack roots
   C. Depend on water for fertilization
   D. Are covered with a thin cuticle.

4. Which of the following types of epithelia experiences the highest rate of wearing?

   A. Stratified
   B. Ciliated
   C. Squamous
   D. Glandular

5. Which of the following is a soluble fibrous protein?

   A. Myosin
   B. Collagen
   C. Myoglobin
   D. Fibrinogen

6. Which one of the following hereditary characteristics is known to be sex-limited?

   A. Haemophilia
   B. Baldness
   C. Albinism
   D. Colour blindness

7. Which one of the following is **not** a renewable natural resource?

A. Carbonate
B. Petroleum
C. Water
D. Nitrogen.

8. The competitive exclusion principle attempts to explain why.

A. Particular niche contains only one species
B. Pioneer plants are not found in established communities.
C. There are rarely more than five trophic levels in an ecosystem.
D. The diversity of a habitat increases as succession proceeds.

9. Which one of the following is a non – nucleated cell?

A. Thrombocytes
B. Lymphocytes
C. Leucocytes
D. Phagocytes

10. Which one of the following is **not** a major source of genetic variation within a gene pool?

A. Crossing over
B. Independent assortment
C. Non-random breading
D. Mutation

11. Ultrafiltration occurs through slits of adjacent specialized cells of Bowman's capsule called.

A. Kupffer cells
B. Leydig cells
C. Macrophage cells
D. Podocytes

12. Which one of the following couples is likely to produce a foetus suffering from fetal crythroblastosis?

A. Rh^+ mother and Rh^- father
B. Rh^- mother and Rh^- father
C. Rh^+ mother and Rh^+ father
D. Rh^- mother and Rh^+ father

13. Which one of the following cells would most probably contain the greatest number of golgi bodies?

A. White blood cells
B. Nerve cells
C. Muscle cells
D. Secretory cells

14. The magnitude of the force that a caudal fin applies to the water during fish locomotion depends on the following except its

A. Weight
B. Speed of action
C. Surface area
D. angle of attack

15. Which of these factors would inhibit ADH release?

A. High fluid intake
B. Low blood volume
C. High blood sodium level
D. Low fluid intake

16. If cyclic phosphorylation was to operate alone the following would not occur except

A. ATP release
B. Oxygen production
C. activation of pigment system II
D. reduction of carbondioxide

17. During excretion in insects, which of the following enter the malpighian tubules passively?

A. K^+ and Na^+
B. Carbondioxide and water
C. Salts and water
D. Uric acid and ammonia

18. The following reproductive strategies have ensured success of angiosperms except

A. Having flowers.
B. Double fertilization.
C. Rapid sexual reproduction.
D. Vegetative reproduction.

19. The extra embryonic membrane responsible for the embryo's homeostasis is

A. Yolk sac
B. Amnion
C. Allantois
D. Chorion

20. The first physical process that occurs during seed germination involves.

A. Imbibition
B. Osmosis
C. Active transport
D. Diffusion.

21. The base sequence on a section of the non-coding DNA strand is CGTAAC. Which of these are the complementary anticodons to the above bases?

A. GCA,TTG
B. CGU,AAC
C. GCA,UUG
D. GCU,AAG

22. The following are membrane-bond enzymes except

A. Dipeptidases
B. Maltase
C. Trypsin
D. Enterokinase

23. Which of these cells undergo diapedesis?

A. Neutrophils
B. Basophils
C. Eusinophils
D. Monocytes

24. Hyperpolarisation across a neurone is due to

A. Slight delay in closing all the potassium gates compared with sodium gates.
B. Slight delay in closing all the sodium gates compared with potassium gates.
C. More potassium and sodium ions pumped out of the axoplasm.
D. More negative ions diffusing into the axoplasm.

Turn Ov

25. Information from the hypothalamus reaches the anterior pituitary though.

A. The portal system
B. Blood capillaries
C. Neurosecretory cells
D. Axoplasm.

26. Birds in a rice field were exposed to scarecrow. For the first few days, they got scared later ignored it. This is an example of

A. Imprinting
B. Latent Learning
E. Habituation
F. Insight learning

27. Which one of the following is the main filtration barrier in the nephron?

A. Endothelium of the blood capillary
B. Basement membrane of the blood capillaries.
C. Epithelium of the renal capsule
D. The podocytes of the renal capsule.

28. During the process of oogenesis, which one of these structures is formed when the primary oocyte is enclosed by a single layer of cells?

A. Graafian follicle
B. Theca
C. Granulosa
D. Primordial follicles

29. Which one of the following best describes tidal volume of a lung?

A. The total volume of air taken in over the vital capacity.
B. The total amount of air that is expired after deep inspiration.
C. The maximum volume of air that can be exchanged during one breath in and out.
D. Total volume of gas exchanged during one breath in and out.

30. Which one of the following is the final hydrogen acceptor during anaerobic respiration in animals?

A. Lactic acid
B. Pyruvic acid
C. NAD
D. Oxygen

31. Which of the following processes occurs in the bundle shealth cells?

A. Fixation of carbondioxide by PEP.
B. Formation of pyruvate from malate.
C. Regeneration of PEP from pyruvate.
D. Formation of malate from oxaloacetate.

32. What would be the proportion of the F1 generation if a double recessive parent is crossed with a double heterozygous one provided linkage does not occur?

A. 1:1:1:1
B. 1:2:2:1
C. 9:3:3:1
D. 1:3

33. During excretion in insets, which of the following are reabsorbed in the malpighian tubules?

A. Carbondioxide and water
B. K^+ and Na^+
C. $KHCO_3$ and water
D. Uric acid and water.

34. Which one of the following is **not** true about the posterior pituitary gland?

A. Secretions reach it from the hypothalamus through nerve fibres.
B. Information from the hypothalamus is through blood vessels.
C. It does not synthesize any hormones.
D. It releases two hormones.

35. Male infertility may permanently arise from the following except.

A. Sperms having abnormal morphology
B. Auto immunity by the male to his sperms
C. Azoospermia
D. Premature ejaculation.

36. Some seeds may germinate when exposed to a period of cold treatment. This is known as.

A. Vernalisation
B. Photoperiodism
C. Stratification
D. Dormancy.

37. The pulling of limbs inwards towards the body is called

A. Adduction
B. Abduction
C. Rotation
D. Retraction

38. Which one of the following zones of an aquatic ecosystem has the highest concentration of organic materials?

A. Littoral zone
B. Benthic Zone
C. Profundal Zone
D. Hyperlimnion Zone

39. Which one of the following processes describes autocatalysis?

A. Prorennin ⟶ Rennin
B. Chymotrypsinogen ⟶ Chymotrypsin
C. Procarboxypeptidase ⟶ Carboxypeptidase
D. Trypsinogen ⟶ Trypsin.

40. The feeding relationship between the colonial hydroid Hydractinia echinata and the hermit crab Pagurus bernhardus is

A. Mutualism
B. Commensalism
C. Parasitism
D. Saprotrophism

SECTION B (60 MARKS)

41. The graph in **figure 1** shows the relationship between absorbance and rate of photosynthesis when a chlorophyll molecule is shone by light of varying wavelengths in a flowering plant.

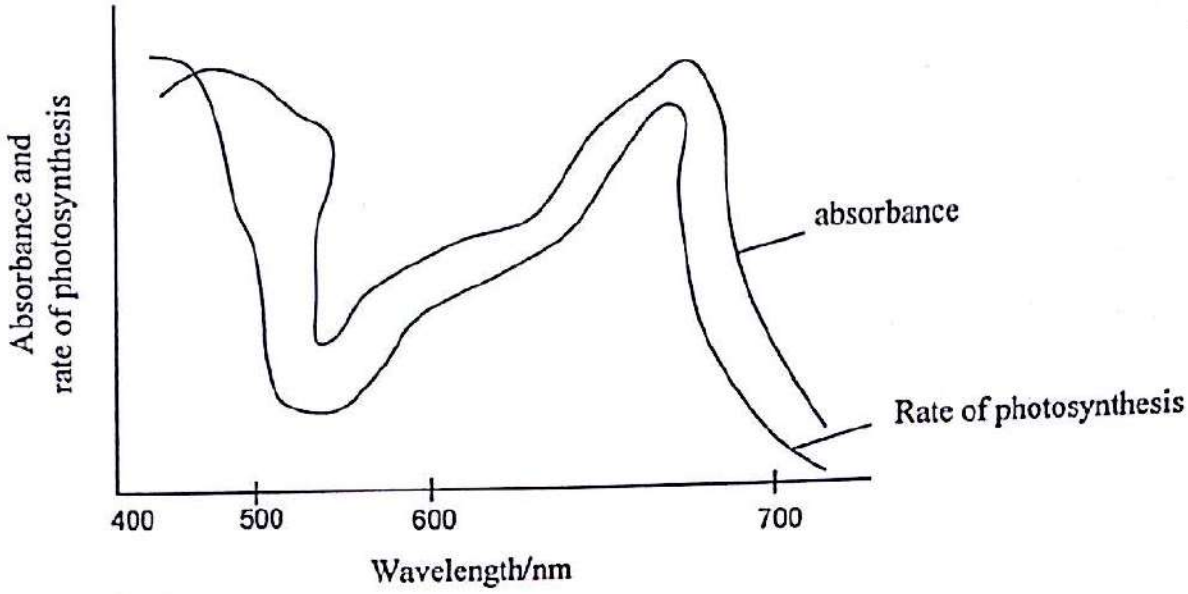

Fig. 1

a) State the relationship between absorbance and rate of photosynthesis between

i) 420 nm and 550 nm *(02 marks)*

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ii) 600 nm and 660 nm *(02 marks)*

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b) Explain the relationships in (a) above *(04 marks)*

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Turn Over

c) Explain why a chlorophyll solution fluoresces when observed in darkness and white light is shone through it. *(02 marks)*

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42. a) What is pest resurgence? *(02 marks)*

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b) Suggest reasons why pest resurgence arises when a broad-spectrum pesticide is used in controlling pest population. *(06 marks)*

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c) Give **two** other effects of prolonged pesticide application in controlling pest population. *(02 marks)*

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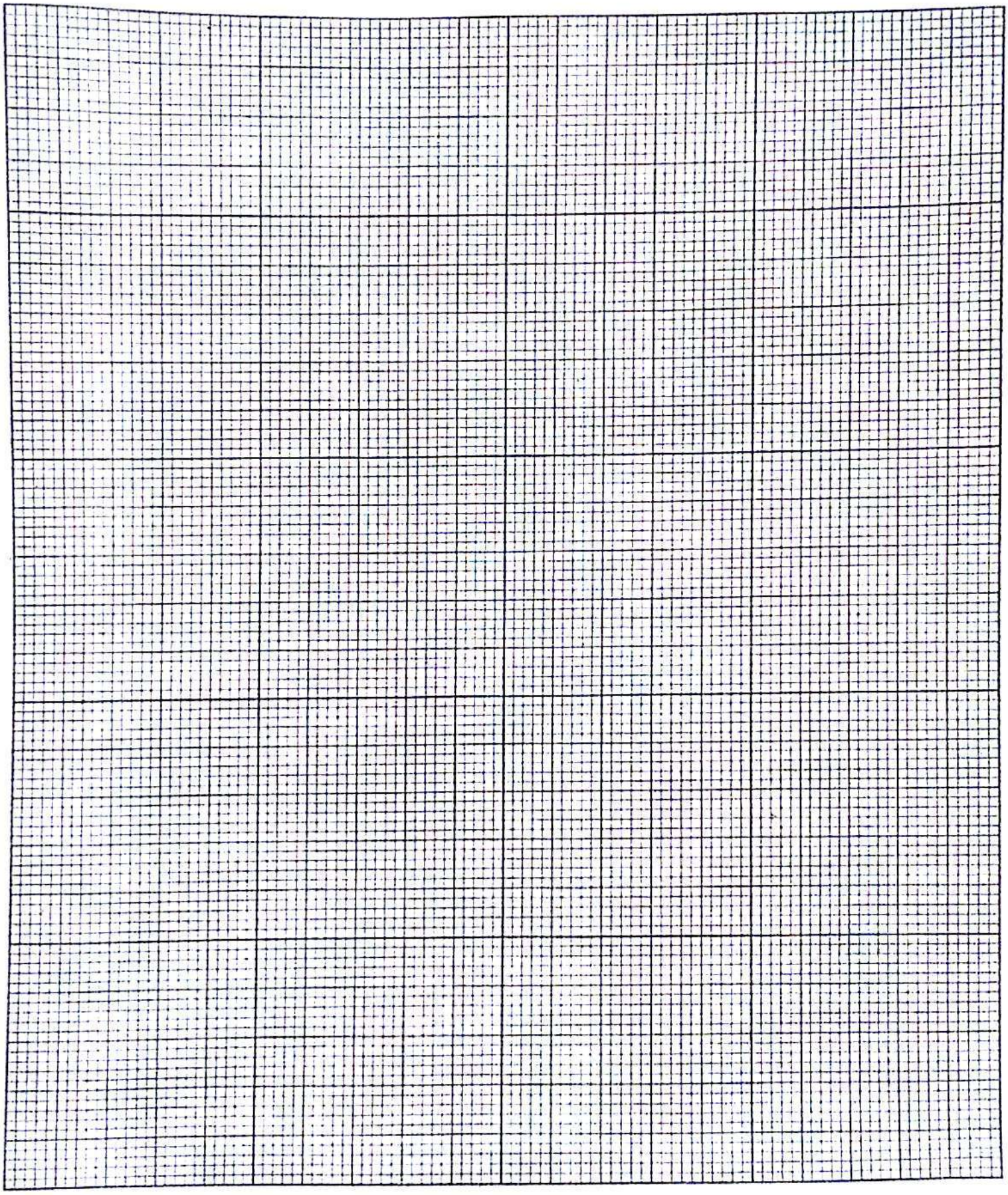
43. **Figure 2** below shows the rate of contraction of two types of muscles for a human being who takes up an exercise from rest for 20 minutes.

Time/Min.	Rate of Muscle contraction	
	Cardiac Muscle	Skeletal Muscle
0	12	4
5	20	16
10	50	32
15	92	60
20	100	10

Fig. 2

a) i) Plot a suitable graph to represent the data in the table above on the squared paper. *(04 marks)*



ii) Explain the changes on the graph above. *(05 marks)*

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b) From your knowledge of muscle action, state the advantage of a cardiac muscle over skeletal muscle to a mammalian body. *(01 mark)*

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44 a) What is chloride shift? *(02 marks)*

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c) i) Outline the main chemical events that take place in a red blood cell on reaching a respiring tissue. *(03 marks)*

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iii) How is a red blood cell adapted to the occurance of the events above. *(02 marks)*

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c) Give **three** changes that may occur in the blood circulatory system of a human being who climbs a mountain up to the peak in 5 days. *(03 marks)*

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45 a) Distinguish between cell division and nuclear division. *(01 mark)*

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b) Explain the role of mitosis in the development of a mature embryo sac. *(03 marks)*

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c) State one importance of each of the following events in meiotic cell division and the stage where each occurs. *(06 marks)*

	Event	**Stage of occurrence**	**Importance**
i)	Synapsis		
ii)	Crossing over		
iii)	Non-disjunction		
iv	Cytokinesis		

46 **Figure 3** below is a graph that shows the extent of precipitation that occurs when serum from different mammals is mixed with sensitized rabbit serum.

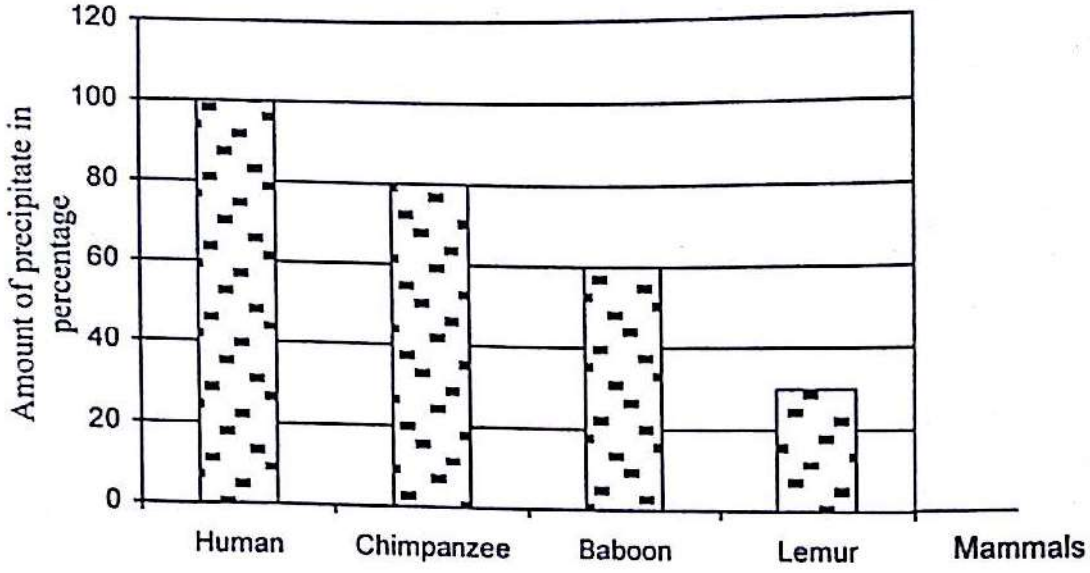

Fig. 3

a) i) Describe the trend of precipitation of serum from human to lemur.
(02 marks)

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ii) Explain how precipitates are formed when sensitized rabbit serum is mixed with any mammal's serum
(03 marks)

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c) Explain the difference in the amount of precipitate formed between chimpanzee and Lemur.
(03 marks)

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d) State **one** evolutionary conclusion about the relationship between Human beings and

i) Chimpanzee *(01 mark)*

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ii) Lemur *(01 mark)*

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END

Name..... Centre/Index No. .....

Name of School ..... Signature.....

P530/1
BIOLOGY
(Theory)
PAPER 1
July/August 2013
$2^1/_2$ hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Advanced Certificate of Education
BIOLOGY
(Theory)

Paper 1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

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' USE ONLY			
SECTION		MARKS	INITIALS
Section A:	1- 40		
Section B:	41		
	42		
	43		
	44		
	45		
	46		
TOTAL			

Turn Over

SECTION A (40 MARKS)

1. Carbon dioxide is carried in the red blood cells of mammals in form of ...
   A. Carboxyhaemoglobin.
   B. Carbamino compound.
   C. Carbonic anhydrase.
   D. Haemoglobinic acid.

2. The process in the liver by which an amino acid is converted into a substrate which can be a raw material for release of energy is known as..
   A. Deamination.
   B. Transamination.
   C. Phosphorylation.
   D. Glycolysis.

3. Which of the following wave length bands of light is least absorbed by chlorophyll?
   A. 450 – 500nm (blue).
   B. 600 – 650nm (yellow).
   C. 650 – 700nm (orange).
   D. 700 - 750nm (red).

4. Which one of the following influences the rate at which mammals expend energy?
   A. Liver.
   B. Pancreas.
   C. Adrenal cortex.
   D. Thyroid.

5. The urine that flows out of the collecting duct has its osmotic concentration nearest to that of the
   A. Proximal convoluted tubule.
   B. Distal convoluted tubule.
   C. Medulla.
   D. Cortex.

6. The alimentary canals of carivores are relatively shorter than those of herbivores because.
   A. Their mainly protein diet is relatively easier to digest.
   B. They eat diet which is largely protein in nature.
   C. They have to maintain low weight to be able to chase prey.
   D. They eat little food at a time.

7. Figure 1 below represents mitosis

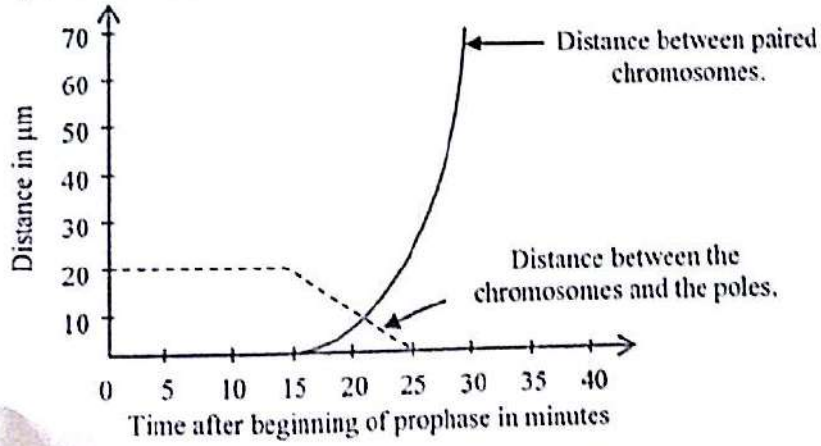

Fig. 1

How long after the start of prophase do the chromosomes split into chromatids and begin their movement towards the poles?

A. 0 minutes.
B. 15 minutes.
C. 25 minutes.
D. 30 minutes.

8. Which one of the following conditions 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^+

9. Table 1 below shows changes in nutrient content of seedlings during germination.

Duration of germination in days	Fat % of dry weight	Glucose % of dry weight
0	71.4	0.0
2	63.9	-
5	48.8	3.1
8	25.0	8.4
13	14.1	13.7
16	4.9	17.4

During the first 13 days of germination, the respiratory quotient (R.Q) would,

A. decrease.
B. increase.
C. remain constant.
D. fluctuate.

10. Dry weight is the best method of estimating growth in an organism because it,

A. does not involve destroying the organism.
B. is easier to determine.
C. neither increases nor decreases.
D. is constituted of weight of the protoplasm synthesized.

11. Which one of the following is the ovum developed from?

A. Primary oocyte.
B. Primordial germ cell.
C. Ooganium.
D. Secondary oocyte.

12. Which combination of phyla consists of the most advanced organisms?

A. Tracheophyta and chordata.
B. Tracheophyta and echinodermata.
C. Tracheoplyta and annelida.
D. Chordata and cnidaria.

13. Which one of the following is not a Porphyrin?
    A. Haemoglobin.
    B. Chlorophyll.
    C. Cytochrome.
    D. Riboflavin.

14. Prolonged menstrual periods may be caused by,
    A. high levels of progesterone.
    B. a decrease in production of follicle stimulating hormone.
    C high levels of luteinising hormone.
    D. a deficiency of oestrogen.

15. Surfactant used in treatment of lungs is meant to do the following EXCEPT:-
    A. prevention of friction of the lungs.
    B. killing microbes.
    C. reduction of energy used to inflate the lungs.
    D. increasing the rate of oxygen diffusion.

16. If oxygen is unavailable, the electron transport system fails mainly because;
    A. there will be no atp electron transport.
    B. hydrogen cannot be split to release electrons.
    C. reduced nad and fad cannot be oxidized.
    D. oxidised nad and fad cannot be reduced.

17. Which one of the following occurs during inhibitory post synaptic potentials
    A. Excites post synaptic neurones.
    B. Excites presynaptic neurones.
    C. Cancels the effect of some excitatory post synaptic potentials.
    D. Released large amounts of transmitter substance.

18. Which one of the following terms is used to refer to displacement of the oxygen hemoglobin dissociation curve by a change in pH?
    A. Bohr effect
    B. Decomposition
    C. Chloride shift
    D. Alkaline tide

19. Which one of the following statements about woody stems is incorrect?
    A. Secondary phloem accumulates to form the wood.
    B. The stem is organised into a central pith, wood and outer bark.
    C. Cork cambium produces water proof cork cells that become bark.
    D. Woody stems contains secondary growth.

20. Which one the following terms is used to refer to sexual reproduction in plants involving two separate plants with separate sexes;
    A. Dioecy
    B. Bisexual
    C. Hermaphroditism
    D. Monoecy

21. Which one of the following cells are **NOT** diploid?
    A. Oogonia
    B. Primary oocytes
    C. Follicle cells
    D. Secondary oocytes

22. The biological roles of a protein molecule is dependent on;-
    A. The sequence of amino acids it contains.
    B. The pattern of folding of the amino acids.
    C. Other protein molecules with which it is associated with.
    D. Its three dimensional shape.

23. Which one of the following inhibits self fertilization in plants?
    A. Stamens and stigma mature at the same time.
    B. The monoecious condition.
    C. The dioecious condition.
    D. The hermaphrodite condition.

24. In humans, albinism is recessive to normal pigmentation, if the frequency of the albino allele in a population is 10%. What would be the expected proportion of albinos in the population?
    A. 0.9
    B. 0.3
    C. 0.1
    D. 1.0

25. The type of selection that can most likely lead to polymorphism within a population is termed as;
    A. Artificial selection.
    B. Disruptive selection.
    C. Stabilizing selection.
    D. Directional selection.

26. Which one of the following is an evolutionally effect of predation?
    A. Prey organism develops mechanisms that minimize predation.
    B. Predators starve to death.
    C. Prey organisms are completely eliminated.
    D. Predators become weaker.

27. Which one of the following factors is least likely to contribute to the development of new species?
    A. Chromosomal changes.
    B. Gene mutations.
    C. Environmental stability.
    D. Geographical isolation.

28. Excessive use of pesticides is dangerous because;
A. They cause eutrophication.
B. They cause pest resistance.
C. They cause bioaccumulation.
D. They cause biomagnification.

29. Which one of the following theories best explains how double membrane organelles came to exist in eukaryotes?
A. Endosymbiosis
B. Endometriosis
C. Endoparasitism
D. Endocytosis

30. Which one of the following secretions is produced by the anterior pituitary?
A. Antidiuretic hormone.
B. Aldosterone.
C. Follicle stimulating hormone.
D. Oestrogen.

31. Bile production is stimulated by,
A. Gastrin
B. Cholecystokinin (cck)
C. Enterogastrone
D. Secretin

32. Which one of the following are involved in cell-mediated immunity?
i) B- lymphocytes
ii) T – lymphocytes
iii) Inflammatory response
iv) Lysozymes
A. (i) and (iv)
B. (i) and (ii)
C. (ii) and iii)
D. (ii) and iv)

33. Figure 2 below shows the percentage in flowering of a plant at different light periods

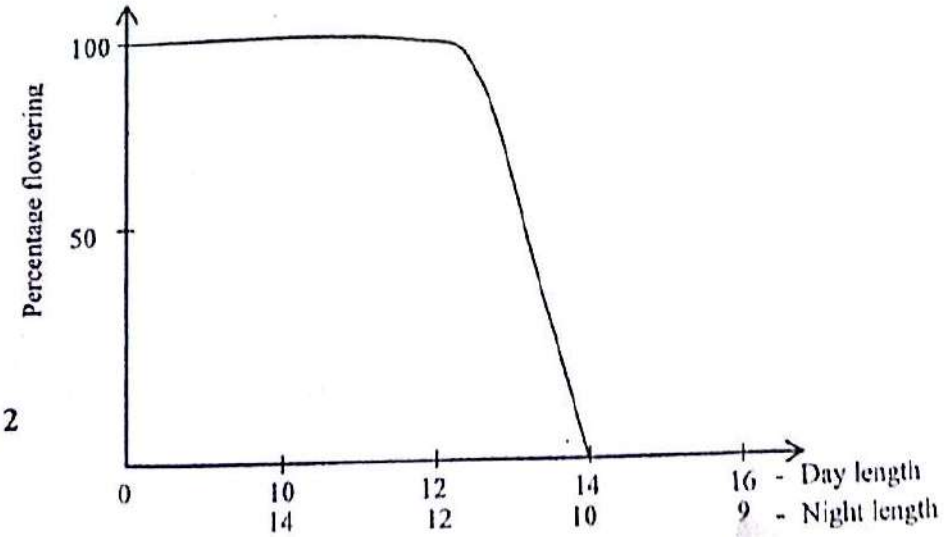

Fig. 2

The plant can be described as
A. long day plant
B. short day plant
C. day neutral plant
D. intermediate day plant

34. During exhalation in mammals, which of the following occurs:
A. The external intercostal muscles relax while the internal intercostal muscles contract.
B. The external intercostal muscles contract while the internal intercostal muscles relax
C. The diaphragm muscles contract
D. The ribcage is pulled upwards and outwards.

35. When using the capture –mark-recapture method, during the release of the animals one has to consider the following factors 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 organism in any way.

36. In DNA replication; each new
A. single helix is composed of 50% protein and 50% DNA protein
B. triple helix is composed of one of DNA strand and two new DNA strands.
C. double helix is composed of one old DNA strand and two new DNA strands.
D. double helix is composed of one old protein strand and one new protein strand.

37. Which of the following factors increase the rate of diffusion across a membrane?
A. Less polarity of the membrane
B. Large size of diffusing molecules
C. Lower temperature
D. High difference in concentration of the diffusing molecules.

38. A cotton plant known to be heterozygous for a recessive gene defect which makes the plant fail to produce seeds was self pollinated and gave rise to 500 seedlings.
How many of the seedlings will fail to produce seeds?
A. 150
B. 250
C. 125
D. 300

39. Which one of the following is not an advantage gained from innate evolutionary behaviour?
A. Longevity of the organism.
B. Survivorship of the orgasim.
C. Learning by the orgasim.
D. Biological fitness of the orgasim.

40. The function of the protractor muscles of a limb is to pull the limb
A. forwards.
B. backwards.
C. sideways away from the body.
D. inwards towards the body.

SECTION B (60 MARKS)

41. Starch and glycogen are important energy storage compounds in organisms.

a) State **three** similarities in the structure of starch and glycogen. *(03marks)*

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b) Give **three** advantages that make starch and glycogen suitable storage compounds *(03marks)*

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c) State the advantages of storing fat over glycogen. *(03marks)*

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d) Explain why large herbivores like cows can not digest starch but depend on microscopic bacteria to digest cellulose in the plant material they eat. *(02marks)*

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42. a) With a specific example in mammalian females, explain what is meant by the term gonad. *(02marks)*

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b) Describe the gonadial activity in human females leading to production of functional Ova. *(05 marks)*

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c) State **two** harmones which regulate gonadial activity described in (b) above; stating the specific role of each hormone. *(02marks)*

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d) Suggest **one** significance of the process described **in** (b) above in variation: *(01marks)*

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(01mark)

43. a) Figure 3 below shows the effect of carbon dioxide concentration on photosynthesis of a rice plant leaf (a C_3 plant) and that of sugar cane (a C_4 plant) compared. Study it carefully and use it to answer the questions that follow:

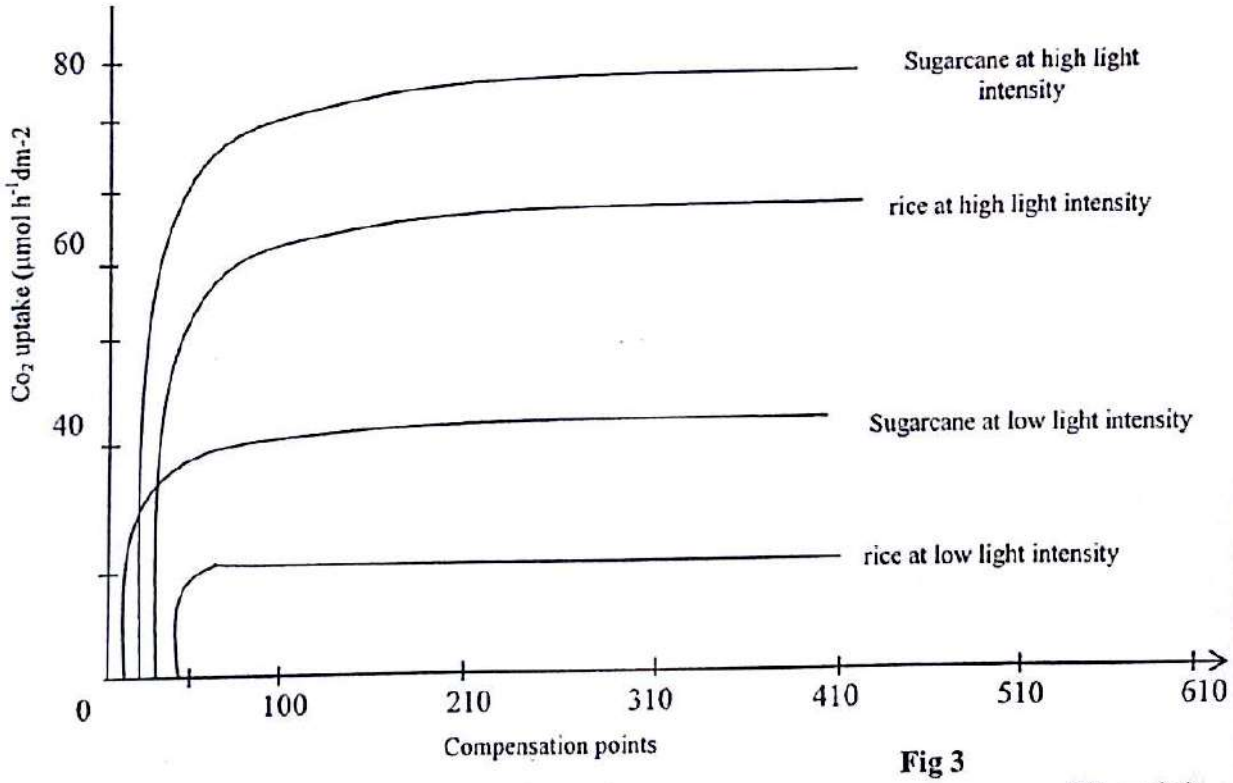

Fig 3

(i) Define the term compensation point. (02marks)

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(ii) What **four** conclusions can you draw from the above results. (04marks)

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Turn Over

b) State any **three** differences in the photosynthetic process of C_3 and C_4 plants *(03 marks)*

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44. a) What is summation? *(01 mark)*

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b) Describe the following types of summation

(i) Temporal summation *(02 marks)*

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(ii) Spatial summation *(02 marks)*

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c) State two advantages of nerve transmission across chemical synapses *(02 marks)*

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d) What is the main distinction between classical conditioning and operant conditioning? *(01mark)*

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e) State any two advantages of social bchahiour to the organisms concerned.
(02 mark)

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45. a) Briefly explain what is meant by the terms;

i) Endangered species *(01mark)*

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ii) Extinction *(01mark)*

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b) i) State **three** ways human activity has increased the rate of extinction of species in the recent times. *(03marks)*

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c) Suggest **three** practical measures that can be put in place to prevent extinction of species in your country. *(03marks)*

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d) Explain why large predators are more likely to become extinct as compared to primary consumers. *(02marks)*

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46. Wild rats are grey coloured while albino rats are white in colour. The results below are for breeding experiments involving the two species of rats:-

A. Mating albino rats with wild rats produced equal propotions of wild and albino rats

B. Mating wild offsprings from A produced litter of wild and albino rats in ratio of 2: 1 respectively.

C. Mating albino rats produced only litter of albino rats.

a) Using suitable symbols, work out the mating in B showing the phenotypic and genotypic proportions of the off springs. *(04marks)*

b) From your answer in a) above explain:-

(i) How colour in rats is controlled *($01^1/_2$mks)*

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(ii) The results for the matings A-C above *($02^1/_2$mks)*

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c) Give **two** ecological significance of colour in organisms. *(02 marks)*

1 .....

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2 .....

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END

Name..... Centre/Index No. .....

Name of School ..... Signature.....

P530/1
BIOLOGY
PAPER 1
July/August 2014
$2^{1}/_{2}$ hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Advanced Certificate of Education
BIOLOGY
(Theory)

Paper 1

2 hours 30 minutes

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 EXAMINERS' USE ONLY			
SECTION		**MARKS**	**Examiners' initials & No.**
Section A:	1- 40		
Section B:	41		
	42		
	43		
	44		
	45		
	46		
TOTAL			

Turn Over

SECTION A (40 MARKS)

Write the letter to the correct answer in the corresponding box. Each question in this section carries **one** *mark.*

1. The AIDs virus cannot multiply outside a living cell because
   A. They are too small to reproduce.
   B. Not all of them contain DNA.
   C. They are unable to absorb raw materials from the surrounding.
   D. They are unable to synthesize their own DNA.

2. In order to survive in the sea, a marine teleost
   A. Loses water by osmosis and absorbs salts.
   B. Swallows water and absorbs salts.
   C. Swallows water and eliminates salts.
   D. Gains water by osmosis and eliminates salts.

3. Which of the following causes the closure of aortic valves during cardiac cycle in mammalian heart?
   A. Ventricular pressure falling below aortic pressure.
   B. Contraction of ventricles.
   C. Filling of atria with blood.
   D. Ventricular pressure rising above aortic pressure.

4. Which of the following sets of inner ear parts constitutes the organ of corti?
   A. Tectorial membrane, basilar membrane, sensory hair cells.
   B. Tectorial membrane, basilar membrane, auditory nerve.
   C. Tectorial membrane, middle canal, basilar membrane.
   D. Endolymph, Reissner's membrane, basilar membrane.

5. A histologist would describe the layered, flat, scaly epithelium of the human skin as:
   A. Simple pavement epithelium.
   B. Stratified columnar.
   C. Stratified squamous.
   D. Pseudostratified cuboidal.

6. The enzyme that promotes mRNA synthesis in the nucleus is
   A. DNA ligase.
   B. DNA polymerase.
   C. RNA ligase.
   D. RNA polymerase.

7. Figure 1 below shows the changes in sweet potato root tubers during their growth with time.

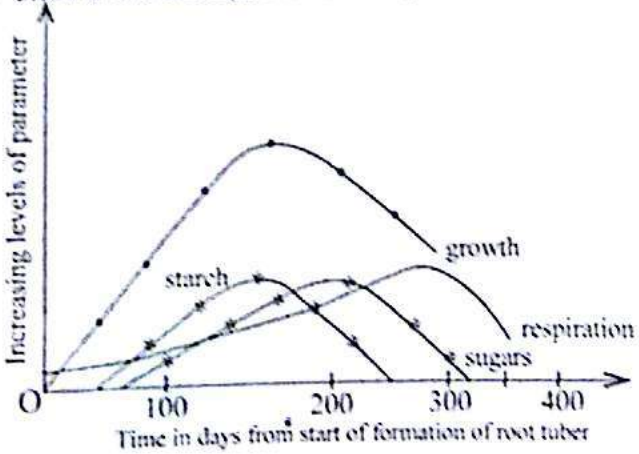


Fig. 1

How many days after start of formation of root tuber should the tuber be harvested?

A. 150
B. 200
C. 250
D. 300

8. Which of the following influences the rate at which mammals utilize energy?

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

9. Organisms which use the energy from the oxidation of substances already on earth to fix carbon are called?

A. Saprophytic heterotrophs.
B. Photosynthetic autotrophs.
C. Chemosynthetic heterotrophs.
D. Chemosynthetic autotrophs.

10. In the root of a dicotyledonous plant, casparian strips are found in the

A. Pericycle.
B. Endodermis.
C. Starch sheath.
D. Xylem vessels.

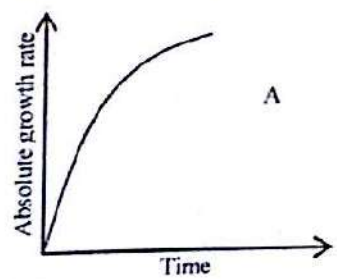
11. Which of the following groups of animals have the most efficient system of gaseous exchange?

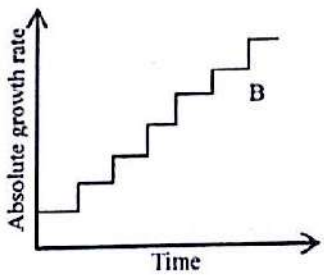
A. Insects.
B. Bony fish.
C. Amphibians.
D. Mammals.

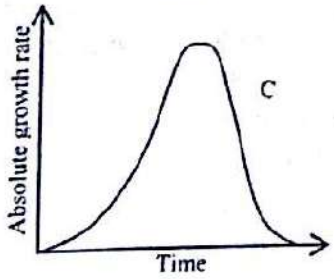
12. The smallest biological unit that can evolve over time is

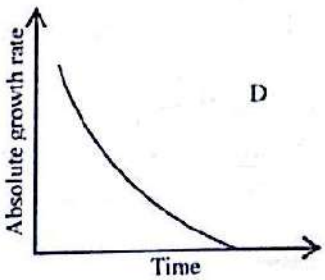
A. A cell.
B. An individual organism.
C. A species.
D. A population.

13. Which one of the following graphs correctly represents the absolute growth rate of a multi cellular organism?









14. Which of the following components increases the flexibility of the plasma membrane?
A. Cholesterol.
B. Phospholipids.
C. Transmembrane proteins.
D. Glycolipids.

15. In humans, in ability to convert amino acid phenylamine to tryosine results into a condition known as
A. Sickle cell.
B. Phenylketonuria.
C. Down's syndrome.
D. Klinefelter syndrome.

16. During the final month of pregnancy, the uterus:
A. expands to create more space.
B. becomes more sensitive to oxytocin.
C. becomes highly vascularised.
D. develops umbilical cord.

17. Which of the following is not an adaptation for photosynthesis in shade plants?
A. High chlorophyll content.
B. Low compensation point.
C. Thin leaves.
D. Thick leaves.

18. Which of these substances are reabsorbed passively in the proximal convoluted tubule and actively in the distal convoluted tubule?
A. Glucose.
B. Chloride ions.
C. Sodium ions.
D. Water.

19. In the Calvin cycle energy is required during:
A. Fixation of CO_2 by Ribulose biphosphate.
B. Conversion of glycerate phosphate to triose phosphate.
C. Conversion of Ribulose phosphate to triose biphosphate.
D. The activation of the enzyme Ribulose biphosphate carboxylase.

20. Mammals whose limbs have short thick bones are most likely to be adapted for support during
A. Jumping.
B. Slow locomotion.
C. Running.
D. Climbing.

21. Which of these is the function of calcium ions during muscular movement?
A. Bind to the blocking molecules causing them to move and expose the myosin binding site.
B. Bind to actin molecules in a way that prevents myosin heads from becoming attached to it.
C. Supply energy for the flexing of the myosin head in the power stroke.
D. Untwist the helix stage so as to expose the myosin binding site.

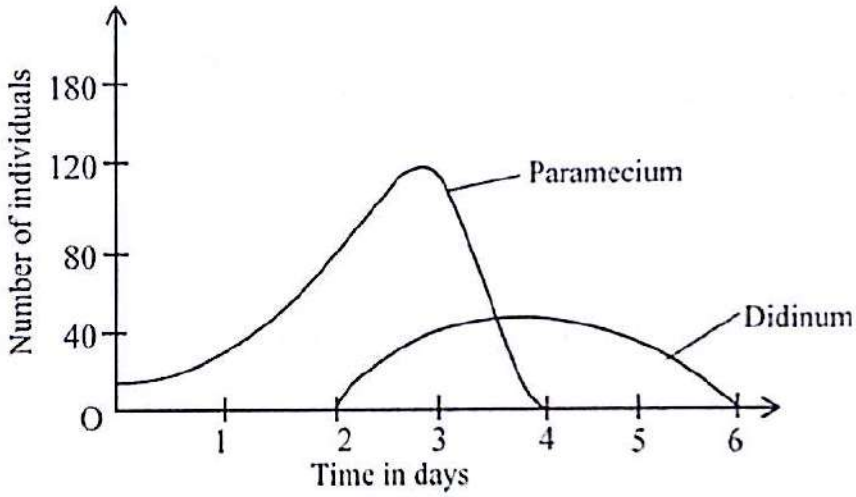
22. Impulses transmitted by optic fibres in the retina are generated by
A. Bipolar neurones.
B. Amacrine cells.
C. Rods and cones.
D. Ganglion cells.

23. Which one of the following is not a phytochrome controlled physiological response
A. Seed germination.
B. Root branching.
C. Flowering.
D. On set of senescence.

24. Which one of the following aids sperm penetration into the ovum during fertilization?
A. Enzymes in the acrosome dissolving the jelly coat.
B. Forward pressure of the tail forces it through the vitelline membrane.
C. Their wedge shape and chemical attraction to the ovum.
D. Ability to melt its way using its nucleic acid.

25. An investigation on the interaction of Paramecium and Didinum gave the results as shown in figure 2 below.

Fig. 2



From the results the extinction of Didinum could be explained by
A. Paramecium is predators to Didinum so it ate them all.
B. Didinum is out competed by Paramecium.
C. Didinum is a predator to Paramecium so when its prey is extinct, it also becomes extinct.
D. Paramecium is a parasite to Didinum so it causes all of them to fall sick and die.

26. Which of the following is <u>not</u> true about the fossil record?
A. Only primitive fossil are found in oldest sediments.
B. New fossil types mark changes in the environment.
C. Recent fossils are much less advanced.
D. Fossil types differ in each sedimentary rock layer.

27. In a large natural ecosystem, competition between two closely related species over time will usually result in;
A. Equal numbers of each species persisting for a long time.
B. Each species occupying a slightly different niche.
C. Death of all members of one species within a short time.
D. Hybridization between the two species resulting into a third species.

28. In horses chesnut coat is dominant to black coat and trotting trait is dominant to pacing. A horse that is hybrid for both traits has the genotype CcTt. If a horse who is a Chesnut pacer is bred several times with a black trotter and always Chesnut trotters and black offsprings are obtained, what are the likely genotypes of the parents?
A. CcTT x ccTT
B. Cctt xccTt.
C. Cctt x ccTT
D. CcTt x ccTt.

29. Preparation of the uterine wall for implantation is influenced by the,
A. Cerebellum, pituitary and ovaries.
B. Hypothalamus, pituitary and ovaries.
C. Uterus, ovaries and amnion.
D. Pituitary, amnion and ovaries.

30. Locomotion in land animals must overcome force that act to keep them stationary. This force is;
A. Inertia.
B. Drag.
C. Aerodynamic force.
D. Gravitational force.

31. Multicellular, nucleated heterotrophs that obtains food by absorbing nutrients from the surrounding belong to kingdom.
A. Animalia.
B. Prokaryotae.
C. Fungi.
D. Protoctista.

32. Which of the following is true about the secretion and action of hormones involved in digestion?
A. Gastrin is secreted by the liver and promotes release of gastric juice by the stomach wall.
B. Chlolecystokin is produced by the duodenum and causes the gall bladder to release bile.
C. Secretin is produced by the intestine and causes the pancreas to release bicarbonate.
D. Enterogastrone is secreted by the ileum and causes the stomach to reduce peristalysis.

33. Which of the following would not be found in the body cells of obligate anaerobes?
A. Respiratory substrates.
B. Plasma membrane.
C. Ribosomes.
D. Acetyl co-enzyme A.

34. Birds associated with herds of buffaloes have a relationship with the buffalos best described as;
A. Commensalism.
B. Symbiosis.
C. Mutualism.
D. Parasitism.

35. Which of the following combinations limits the size of insects?
I. The rate of diffusion of gases in the tracheoles.
II. The absence of thyroxine necessary for metamorphosis.
III. The presence of a hard exoskeleton.
IV. The moulting hormone produced by the thoracic gland.
A. I,III & IV
B. II,III & IV
C. I & III
D. III & IV

36. Which of the following in the life cycle of the pteridophyte corresponds to the anthers of an angiosperm?
A. Gametophyte.
B. Archegonium.
C. Sporangium.
D. Saporophyte.

37. Which embryonic membrane originates from posterior part of the alimentary canal and serves as an organ of respiration and nutrition?
A. Chorion.
B. Allantois.
C. Yolk sac.
D. Amnion.

38. The table I below shows a comparison of some of the properties of four human skeletal tissues.

Table 1

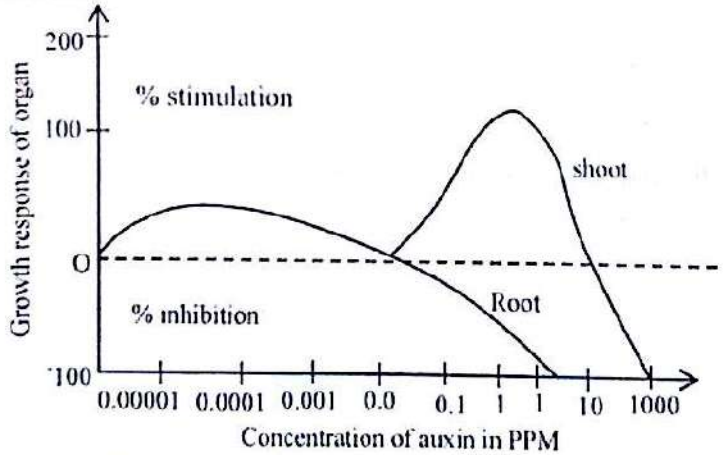
Tissue	Relative density	Stiffness	Strength
Bone	2.0	14,000	180
Cartilage	1.1	15	1
Ligament	1.3	20	210
Tendon	1.3	190	100

A logical conclusion from the above result is that;
A. Stiffness depends on strength.
B. Density contributes more to strength than stiffness.
C. Density contributes more to stiffness than strength.
D. Strength and stiffness are not related.

39. Low level of oestrogen in blood of female adolescents may result into
A. Prolonged menstruation.
B. Growth of Graafian follicles.
C. Proliferation of the uterine wall.
D. Slow growth and repair of uterine wall.

40. Figure 3 shows the effects of various concentrations of auxin in the elongation of the plant root and shoot.

Fig. 3



Which of the following conclusions is true based on the figure above?

A. Required concentration of auxin for growth of the shoot is higher than the root.
B. High concentration of auxin inhibits the growth of the shoot only.
C. Only the shoot requires auxin to grow.
D. The root and shoot require the same amount of auxin for growth.

SECTION B (60MARKS)

Write the answers in the spaces provided.

41. (a) Describe the role of T_4 cells in the human immune response. (02marks)

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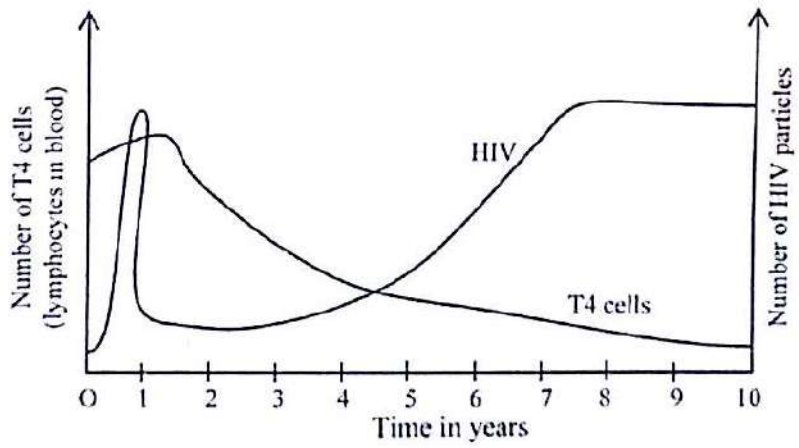
(b) Figure 4 below shows the development of an infection with human immunodeficiency virus (HIV) over a period of 10 years. Changes in the number of T_4 cells are also shown. Study the graphs and answer the questions that follow;

Fig. 4



(i) Describe the changes in the number of HIV particles over the 10 year period. (03marks)

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(ii) Compare the curve for the T_4 cells with that for the HIV particles. (02marks)

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(iii) Explain the differences between the number of T_4 cells in the blood and the number of HIV particles over the 10 year period. (03marks)

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42. (a) Define the following ecological terms;

(i) Community. (01mark)

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(ii) Ecological niche. (01mark)

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(iii) Interspecific competition. (01mark)

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(iv) Migrations. (01mark)

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(b) Describe briefly the Lincoln index method of estimating population size. (03½marks)

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(ii) Outline three disadvantages of using Lincoln index method of estimating population size. (03marks)

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43. Table 2 below shows the concentration of selected ions in the cytoplasm of an axon and in the fluid around the axon.

Table 2

Ion	Concentration mol dm^{-3}	
	Cytoplasm of axon	Fluid around axon
Chloride (cl^-)	4	120
Organic anions (e.g. protein)	163	29
Potassium (k^+)	155	4
Sodium (Na^+)	12	145

Study the information in the table and answer the following questions;

(a) Compare the distribution of positively and negatively charged ions.

(i) within the cytoplasm of axon? (02marks)

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(ii) between the cytoplasm and fluid around the axon? (02marks)

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(b) Account for the difference in concentration of each ion as stated in (a) above. (04marks)

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(c) Explain two factors that determine the speed of nerve impulse along the axon? (02marks)

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44. (a) (i) Define the term osmoconformer. (01mark)

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(ii) Explain osmoregulation in fish occupying both marine and fresh water habitats. (05marks)

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(b) Give two physiological and ecological advantages of the fish in (a) above over the marine teleost.

Physiological advantages. (02marks)

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2. .....

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Ecological advantages. (02marks)

1. .....

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2. .....

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45. Figure 5 below shows the rate of photosynthesis in two different plants over a range of light intensities.

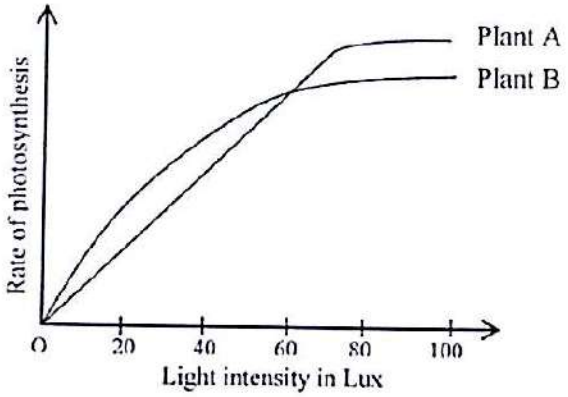

Fig. 5

a) Explain;

(i) the relationship between light intensity and the rate of photosynthesis for plants A and B up to 50 lux. (04marks)

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(ii) why the rate of photosynthesis remains constant at very high light intensities? (01mark)

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b) Giving one reason, state the plant which would grow best in a forest floor? (03marks)

Plant.....

Reason.

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c) State two benefits of photosynthesis to animals. (02marks)

1. .....

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2. .....

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46. A form of baldness in humans is controlled by two alleles B and b, none of which occurs on the X-sex chromosome.

Males who are BB or Bb will be bald while bb males will not be bald. Females who are BB will be bald and females who are Bb or bb will not be bald.

One type of colour blindness is controlled by recessive allele found on the X-sex chromosome. The dominant allele X^A leads to normal colour vision and the recessive allele X^a leads to colour blindness.

Use the symbols given above to answer the following question;

a) State the possible genotypes of a;

(i) bald man who has normal colour vision. (01mark)

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(ii) woman who is not bald but carries an allele for colour blindness. (01mark)

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b) A mother and a father are heterozygous for baldness. The father has normal colour vision while the mother is a carrier for colour blindness. (08marks)

Using symbols;

(i) State the genotype of the parents. (02marks)

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(ii) Show the probability of a son to this couple being colour blind but not bald. (07marks)

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END

Name..... Centre/Index No. .....

Name of School ..... Signature.....

P530/1
BIOLOGY
PAPER 1
July/August 2015
2 1/2 hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Advanced Certificate of Education
BIOLOGY
(Theory)

Paper 1

2 hours 30 minutes

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 EXAMINERS' USE ONLY			
SECTION		**MARKS**	**Examiners' initials & No.**
Section A:	1- 40		
Section B:	41		
	42		
	43		
	44		
	45		
	46		
TOTAL			

SECTION A (40 MARKS)

1. Which one of the following is a typical feature of flowers in dicotyledonous plants?
   A. They do not possess sepals.
   B. The floral parts are arranged in groups of 4s and 5s.
   C. Their petals are fused.
   D. Usually petals are absent.

2. In the mammalian body, regeneration is not possible in
   A. blood
   B. skin
   C. liver
   D. brain

3. Which of the following are reproductive adaptations in birds for terrestrial life?
   A. Parental care and shelled eggs.
   B. Feathers and shelled eggs.
   C. Feathers and lungs.
   D. Lungs and amniotic eggs.

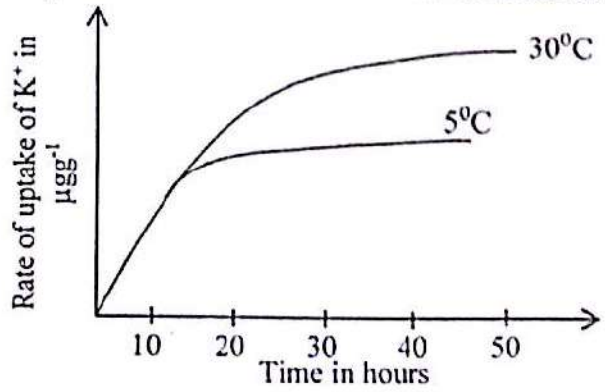
4. Possession of spines on the hind limbs of some insects is to provide.
   A. Protection against enemies.
   B. Support for the lower limbs.
   C. Propulsion during takeoff.
   D. Grip during movements.

5. Lateral inhibition in the mammalian eye is attributed to
   A. Rods and amacrine cells.
   B. Amacrine and horizontal cells.
   C. Horizontal and cone cells.
   D. Cones and rods only.

6. The structures responsible for active transport in the cell surface membrane are
   A. Carbohydrates.
   B. Cholesterol molecules.
   C. Proteins.
   D. Phospholipids.

7. **Figure 1** below shows the rate of potassium ion uptake by slices of carrot tissues immersed in a potassium chloride solution at different temperatures.

Fig. 1



The initial uptake of potassium ions in the first 10 (ten) minutes is by the process of:
   A. Diffusion.
   B. Osmosis.
   C. Pinocytosis
   D. Active transport.

8. Which one of the following is a benefit of gaseous exchange in air compared to water in animal?
   A. Higher concentration of molecular oxygen.
   B. Moist respiratory surface is not required.
   C. No energy is required for ventilation.
   D. Oxygen diffuses more slowly in air.

9. Chemical signals that convey information between members of a species are
   A. Neurotransmitters
   B. Scents
   C. Pheromones
   D. Impulses.

10. The cell organelle that tags proteins so that they can go to their correct destination during development is;
   A. Dictyosome
   B. Ribosome
   C. Endoplasmic reticulum.
   D. Nucleus.

11. The gene that causes albinism in humans is associated with loss of melanin pigment in the skin, grey hair and pink eyes. This gene is therefore said to be;
   A. Polygenic
   B. Pleiotropic
   C. Epistatic
   D. Codominant

12. Haemophilia is caused by a recessive alleles and is sex linked, it occurs mainly in males. If a haemophiliac male marries a carrier female, what will be the percentage of haemophiliac daughters among the children?
   A. O
   B. 25
   C. 50
   D. 75

13. Very small mammals cannot live at altitudes over 4000 metres high on mountains because;
   A. They would lack suitable foods at such altitudes.
   B. They lack sufficient fur to keep them warm.
   C. Their surface area to volume ratio is too high to support breathing.
   D. At such altitudes, the oxygen partial pressures are too low.

14. Which one of the following best describes hardy – Weinberg principle?
   A. $1-P^2 = 2pq + q^2$
   B. $P^2 + pq = 1$
   C. $P^2 - 2pq + q^2 = 1$
   D. $P^2 + 2p^2 + q^2 = 0$

15. Of recent, there is overwhelming death due to cancer. Cancer is a disease caused by:
   A. Mass destruction of cells leading to wounds and great pain in tissues.
   B. A breakdown of control of cell division by mitosis.
   C. Mass destruction of cells leading to swelling of tissue.
   D. Over production of tissue fluid and retention leading to swelling of tissues.

16. Which one of the following is a layer of cells found in cats and other nocturnal mammal's eyes which reflects light back into the eye and so improves night vision during dim light?
A. Choroid epithelium
B. Tapetum
C. Corneal layer
D. Retina

17. Study table 1 below and answer the question that follows.

table 1

Cell type analysed	Average DNA content / cell (10g)
X	0.0
Y	3.35
Kidney	6.70
Lung	6.70

The correct identity of cell types X and Y respectively is
A. Heart cell and liver cells.
B. Spermatozoa and red blood corpuscle.
C. Red blood corpuscles and spermatozoa.
D. Heart cell and spermatozoa.

18. Which one of the following stages in the life cycle of the plasmodium cannot develop any further, when it is within the body of the female anopheles mosquito?
A. Sporozoites
B. Merozoites
C. Gametocytes
D. Trophozoites

19. Which one of the following theories disregards the fact that the earth has existed for about five billion years.
A. Cosmozoan
B. Spontaneous
C. Special creation
D. Steady state

20. Which one of the following layers greatly minimizes incidences of mutations with in a population.
A. Stratosphere
B. Trophosphere
C. Mesosphere
D. Atmosphere

21. Which one of the following is the significance of nitrification to Nitrobacter? To:
A. obtain oxygen for their respiratory activities.
B. obtain organic food substances for their growth.
C. obtain energy for their food synthesis.
D. increase the level of nutrients in the soil.

22. Which one of the following best explains why the population of lions in a natural ecosystem is generally low?
A. Most lions lack enough food.
B. Lion's reproductive rate is low.
C. Lions obtain little energy.
D. Lion's life span is naturally low.

3. Which of the following is not true during hormonal control of breathing?
   A. Impulse from chemoreceptors in the aorta and central arteries stimulate the respiratory centre to increase rate of inspiration.
   B. Stretch receptors in the bronchioles and bronchi monitor the amount of lung ventilation.
   C. Cerebral cortex allows voluntary control of over breathing.
   D. Vagus nerve carries impulses from the respiratory centre to stretch reception to stimulate inspiration.

4. The following are typical features of hydrophytes **except;**
   A. Large floating leaves.
   B. Well-developed xylem
   C. Elongated petiole
   D. Aerial flowers.

5. Which of the following levels of protein structure are demonstrated by a haemoglobin molecule?

	Primary	Secondary	Tertiary	Quaternary
A	✓	X	X	X
B	✓	✓	X	X
C	✓	✓	✓	X
D	✓	✓	✓	✓

6. In muscle cells, myosin molecules continue moving along actin molecules as long as
   A. ADP is present and intracellular acetylcholine is high.
   B. ATP is present and intracellular calcium is high.
   C. ATP is present and troponin is not bound to calcium ions.
   D. ADP is present and tropomyosin is released from intracellular stores.

7. Which one of the following is an example of negative feedback?
   A. Uterine contractions during childbirth stimulate release of a hormone that stimulates more uterine contractions.
   B. A viral infection stimulates the hypothalamus to increase the set point for body temperature.
   C. High blood sugar concentration stimulate the release of a hormone insulin, which stimulates the sugars to move from the blood into cells.
   D. The body temperature of the desert Oryx rises during the hottest part of the day.

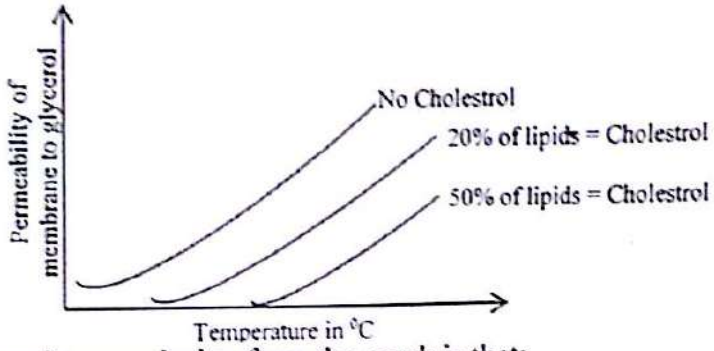
8. What is distinctive about the chlorophylls found in different forms of bacteria?
   A. Their membranes
   B. Their role in carbon fixation
   C. Their absorption spectra.
   D. Their role in acquiring energy.

9. Which one of the following is the strongest evidence that a trait might be influenced by polygenic inheritance?
   A. F_1 offspring of parents with different phenotypes have an intermediate phenotype.
   B. F_1 offspring of parents with different phenotypes have the dominant phenotype.
   C. The trait shows qualitative variation.
   D. The trait shows quantitative variation.

30. Which one of the following sequences best describes the process of cellular respiration.
A. Glycolysis, pyruvate processing, citric acid cycle, ETS and chemiosmosis.
B. Glycolysis, pyruvate processing, ETS, citric acid cycle and chemiosmosis.
C. Chemiosmosis, ETS, citric acid cycle, pyruvate processing and glycolysis.
D. Glycolysis, ETS, chemiosmosis, citric acid cycle and pyruvate processing.

31. Suppose a drug was added to mitochondria that allowed free protons to freely pass through the inner membrane. Which of the following mitochondrial activities would most likely be inhibited?
A. The Krebs cycle
B. Oxidative photophosphorylation
C. Electron transport chain.
D. Oxidative phosphorylation

32. Figure 2 below shows the effect of adding different percentages of cholesterol to a membrane on its permeability to glycerol with changes in temperature.
Fig. 2



The most appropriate conclusion from the graph is that;
A. Membranes are less permeable to glycerol in the absence of cholesterol.
B. Adding cholesterol to a membrane decrease its permeability to glycerol.
C. Adding cholesterol to a membrane increases its permeability to glycerol.
D. Permeability to glycerol depends on both the level of cholesterol and temperature.

33. Proteins that interact with DNA often interact with the phosphates that are part of this molecule. Which of the following types of amino acids would you predict to be present in the DNA building sites of these proteins?
A. Acidic amino acids
B. Basic amino acids
C. Unchanged polar amino acids
D. Non polar amino acids.

34. Which one of the following represents the correct sequence of the stages in the development of spermatozoa?
A. Primary spermatocyte – secondary spermatocyte - spermatids
B. Primary spermatocyte – spermatids – secondary spermatocyte
C. Primordial germ cell – primary spermatocyte - secondary spermatocyte
D. Primordial germ cell - secondary spermatocyle – spermatids.

35. Which one of the following processes is exclusively physical?
A. Capillarity
B. Root pressure
C. Active transport
D. Guttation.

36. The following relate to the biochemical oxygen demand (BOD).
(i) Increase in the population of aerobic microorganisms.
(ii) Increase in the level of organic pollution

(ii) Increase in the level of eutrophication.

Which of these apply when BOD is highest.

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

37. Which one of the following is the world's most common protein?
A. Transaminase
B. Pepsin
C. Ribulose biphosphate carboxylase
D. Nitrite reductase.

38. Figure 3 below shows the promotion of lateral bud growth in intact pea shoots following the application of kinetin.

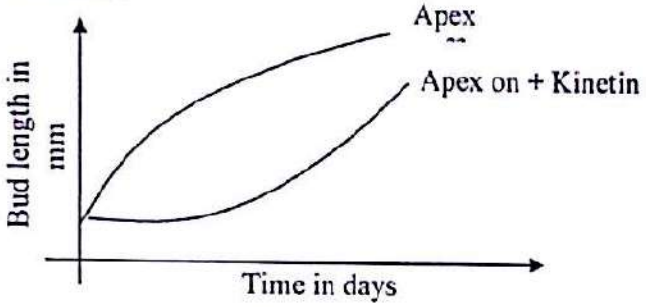


Fig. 3

The results of this experiment show that kinetin:
A. suppresses apical dominance in intact shoots.
B. suppresses bud dormancy
C. promotes apical dominance in intact shoots.
D. promotes bud dormancy.

39. In the early 1930's an environmental watch dog carried out an experimental survey on water pollution in Mississippi river in northern USA and the results obtained are shown in table 2 below:

Table 2

Sampling point	Distance down stream (Km)	B.O.D (PPM)
1	0.0	1.6
2	0.5	1.5
3	1.0	7.0
4	1.5	2.5
5	2.0	3.0

Between which sampling points did the watch dog results show most purification of the river water.
A. 1 and 2
B. 2 and 3
C. 3 and 4
D. 4 and 5

40. During a critical period young children assimilate the speech sounds of their parents into the universal human genetical patterns, so language acquisition appears to be
A. imprinting
B. associative learning
C. fixed action pattern
D. habituation

Turn Over

SECTION B (60 MARKS)

41. (a) Define leaf area index (LAI)? (01mark)

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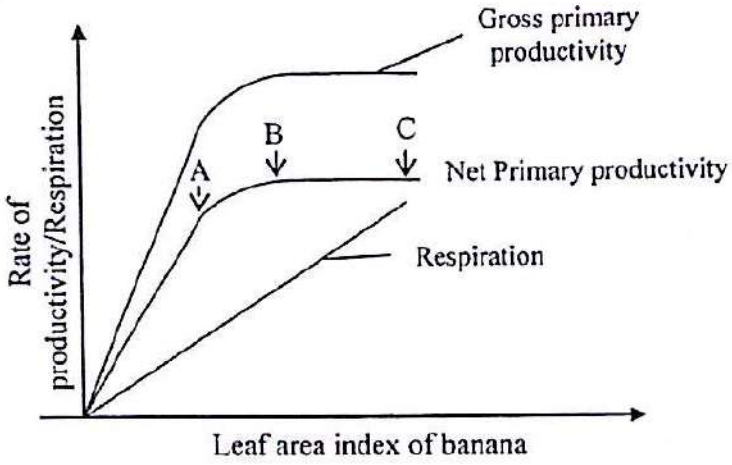
(b) Figure 4 below shows changes in the rates of productivity and respiration with the leaf area index of a banana plant. Study it carefully and answer the questions that follow:

Fig. 4



(i) Explain the relationship between the leaf area index and net primary productivity between points: (02 marks)

A and B

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B and C (05 marks)

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(ii) State the equation that shows the relationship between gross primary productivity, net primary productivity and respiration. (01 mark)

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(iii) Which one of these quantities will give the best indication of the mass of dry matter produced by the banana? (01 mark)

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42. (a) State **four** distinguishing features of angiosperms. (04 marks)

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(b) Describe any **three:-**

(i) features of seed plants that have contributed to their success on land? (03 marks)

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(ii) major differences between plants and animals in their mode of growth and development. (03 marks)

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43. (a) What are target cells? (01 mark)

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(b) Explain;

(i) any two mechanisms by which hormones bring about cellular response in target cells. (07 marks)

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(ii) how a very small amount of hormone is able to exert a large effect on a target cell. (02 marks)

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44. (a) State two outstanding structural differences between lipids and phospholipids. (02 marks)

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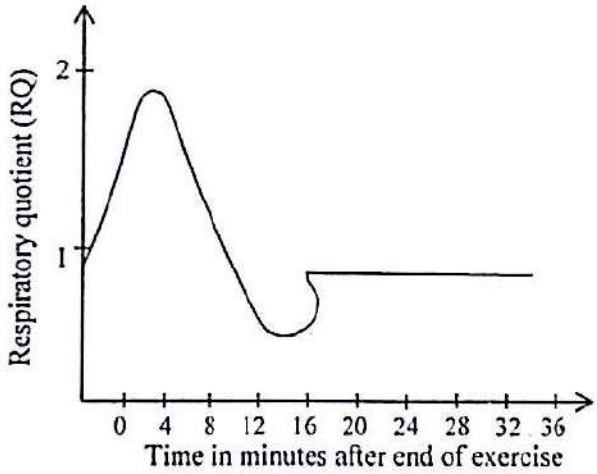
(b) The respiratory quotient (RQ) for a resting person is approximately 0.85. A man exercised vigorously for two (2) minutes and his RQ was measured at regular intervals for 40 minutes. The results were plotted as shown in figure 5 below.

Fig. 5



(i) Explain the variation in RQ up to the fourth minute after the exercise. (02 marks)

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(ii) From the graph; determine the time taken for the RQ value of the man to remain below the normal. Show your working. (01mark)

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(iii) Explain the decline in the RQ value below the normal for the period of time determined above. (03 marks)

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(c) What is the fate of the pyruvic acid formed during anaerobic respiration in a plant cell. (02 marks)

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45. (a) Describe how the following are brought about during locomotion in a fish.

(i) Directional control during propulsion. (03 marks)

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(ii) Eliminating drag during propulsion. (04 marks)

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(b) State **three** ways in which the structure of a long bone such as a femur and the stem in a herbaceous plant are structurally similar. (03 marks)

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46. Table 3 below shows the results of an experiment carried out on the blood sucking bug of genus Rhodinus. Study the information in the table and answer the questions that follow:

Table 3:

Experiment	Results
1. Blood sucked by Bug, then head cut off after 2 days later	Bug survives briefly, no moulting
2. Blood sucked by Bug, then head cut off 7 days later	Bug survives longer and moults
3. Brain from a moulted larva transplanted into another larva of same age.	Larva moults but does not develop into an adult.

Turn Over

(a) Explain:-

(i) the observed results in experiments 1 and 2. (02½ marks)

Experiment 1

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Experiment 2

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(ii) the role of the brain in insect development as observed in experiment 3. (02 marks)

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(b) Suggest;

(i) **one** way the larva can be induced to develop into adult. (01 marks)

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(ii) **four** ecological significance of larvae in the life of a species. (02 marks)

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END

Name..... Centre/Index No. .....

Name of School ..... Signature.....

P530/1
BIOLOGY
PAPER 1
July/August 2018
$2^1/_2$ hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Advanced Certificate of Education
BIOLOGY
(Theory)

Paper 1

2 hours 30 minutes

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 EXAMINERS' USE ONLY			
SECTION		**MARKS**	**Examiners' initials & No.**
Section A:	1- 40		
Section B:	41		
	42		
	43		
	44		
	45		
	46		
TOTAL			

SECTION A (40 MARKS)

Write the letter corresponding to the most correct answer in the box provided on the right.

1. Which of the following structures is present in both eukaryotic and Prokaryotic cells.
   A. Mitochondria.
   B. Ribosomes.
   C. Pili.
   D. Centrioles.

2. An unbranched polysaccharide is made up of glucose monomers joined together by β (beta 1 – 4) linkages. This polysaccharide could be;
   A. amylopectin.
   B. cellulose.
   C. amylose.
   D. glycogen.

3. Which of the following statements about the sodium-potassium pump is correct?
   A. It results in a higher concentration of sodium ions inside the cell
   B. The transport protein has an affinity for sodium ions in the cytoplasm
   C. The transport protein has an affinity for sodium ions in the extracellular fluid.
   D. It results in a higher concentration of potassium ions outside the cell.

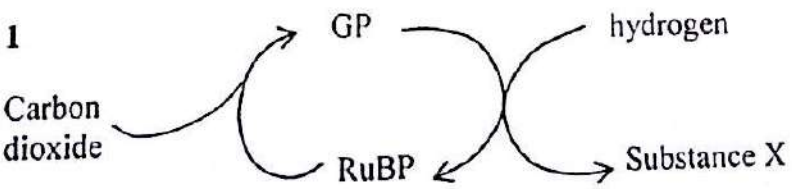
4. Which of the following statements is **incorrect** about fungi?
   A. they are all eukaryotic.
   B. some are photosynthetic.
   C. they all have rigid cell walls.
   D. most are filamentous.

5. Ferns undergo alternation of generations in which a;
   A. dominant sporophyte alternates with an independent gametophyte.
   B. dominant gametophyte alternates with a dependent sporophyte.
   C. sporophyte and a gametophyte have equal life spans.
   D. gametophyte produces gamete by meiosis.

6. Increase in the dark form of the peppered moth was as a result of the;
   A. dark moths migrating to areas which offered the best camouflage.
   B. change in selection pressure.
   C. change in the prey species taken by birds.
   D. increase in the mutation rate.

7. Figure1 below shows an outline of the carbon fixation stage of photosynthesis substance X is;

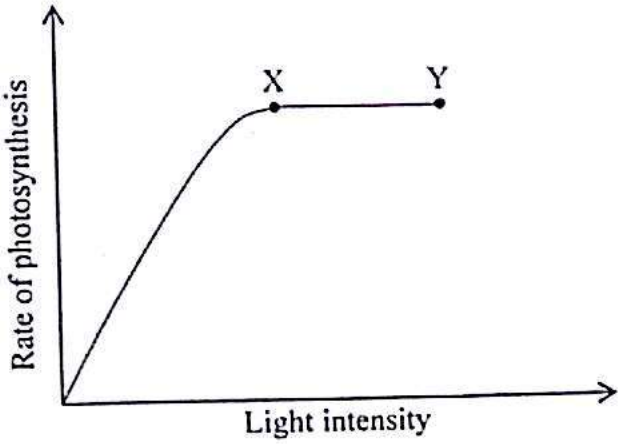
Fig. 1



A. ATP.
B. Glucose.
C. Oxygen.
D. Water.

8. Figure 2 below shows the effect of increasing light intensity on the rate of photosynthesis in a green plant.

Fig. 2



Which of the following factors limit the rate of photosynthesis between points X and Y?
A. Light intensity and oxygen concentration.
B. Temperature and oxygen concentration.
C. Temperature and carbon dioxide concentration.
D. Carbon dioxide concentration and light intensity.

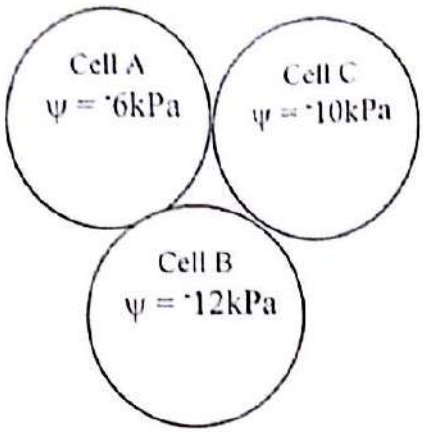
9. Which of the following would not be formed during anaerobic breakdown of glucose by yeast?
A. water.
B. ATP.
C. carbondioxide.
D. ethanol.

10. A plant becomes etiolated when it
A. is grown in soil with low nitrogen levels.
B. is grown in the dark.
C. is treated with gibberellic acid.
D. has its apical bud removed.

11. A species that plays a role vital for the survival of other species in an ecosystem is called
A. a keystone species.
B. a native species.
C. an invasive species.
D. a dominant species.

12. Figure 3 below shows three adjacent cells and their water potentials (ψ).

Fig. 3



Which of the following is the correct sequence of water movement between all the cells?

A. A ⟶ C ⟶ B
B. C ⟶ B ⟶ A
C. A ⟶ B ⟶ C
D. B ⟶ A ⟶ C

13. Lack of relaxation between successive stimuli in a muscle is referred to as
A. tonus.
B. spasm.
C. fatigue.
D. tetanus.

14. Which of the following features is **NOT** present in the phylum arthropoda?
A. Jointed appendages.
B. Chitinous exoskeleton.
C. Parapodia.
D. Metameric segmentation.

15. Reduction in pH of blood will lead to;
A. the release of bicarbonate ions by the liver.
B. reduction in the rate of heart beat.
C. reduced blood supply to the brain.
D. a decrease in the affinity of haemoglobin for oxygen.

16. A triglyceride is composed of;
A. three glycerol and three fatty acid molecules.
B. three glycerol and one fatty acid molecule.
C. one glycerol and three fatty acid molecules.
D. one glycerol and one fatty acid molecule.

17. In mammals, which of the following blood vessels would normally carry the largest amount of urea?
A. Hepatic portal vein.
B. Renal vein.
C. Dorsal aorta.
D. Hepatic vein.

18. Analogous structures are a result of
A. stabilizing selection.
B. divergent evolution.
C. convergent evolution.
D. shared ancestry.

19. Gause's principle of competitive exclusion states that
A. larger organisms exclude smaller ones through competition.
B. more abundant species will exclude the less abundant species through competition.
C. competition for the same resources excludes species having different food preferences.
D. no two species can occupy the same niche indefinitely for the same limiting resources.

20. The type of gaseous exchange structures in organisms would greatly be influenced by;
A. metabolic rate and respiratory medium.
B. habitat and metabolic rate.
C. body size and metabolic rate.
D. habitat and size of cuticle.

21. Ascent of water in a tall plant as a result of the transpiration stream is due to;
A. root pressure.
B. adhesion.
C. cohesion.
D. capillarity.

22. In which of the following parts of the mammalian testis is the Interstitial Cell Stimulating Hormone (ICSH) produced?
A. leyding cells.
B. primordial germ cells.
C. sertoli cells.
D. seminiferous tubules.

23. Which of the following parts of the mammalian ear are absent in the ear of an amphibian?
A. Ear drum and pinna.
B. Pinna and auditory canal.
C. Eustachian tube and pinna.
D. Auditory canal and Eustachian tube.

24. The secretions of the hypothalamus are transported to the posterior lobe of the pituitary gland through
A. portal blood vessels.
B. pituitary stalk.
C. capillary network.
D. nerve fibres.

25. Table 1 below shows the results obtained from the process of estimating the population size of certain plant species in Ziika whose total land area is 10,000m^2 using aquadrat of 1m^2. From the results the population size of the plant species is;

Table 1

Throws made	1	2	3	4	5	6	7	8	9	10
Number of plants in each throw	53	74	40	63	56	53	70	72	57	53

A. 600,000 plants.
B. 60,000 plants.
C. 6000 plants.
D. 60 plants.

26. The type of learnt behavior that results due to continuous repetition of a stimulus that is not associated with a punishment or reward is
A. associative learning.
B. latent learning.
C. insight learning.
D. habituation.

27. Which of the following is **NOT** used to classify organisms in kingdom protoctista?
A. The type of pigment present.
B. The type of locomotory structure if present.
C. Mode of nutrition.
D. Type of cell wall.

28. Ripening of fruits in plants is caused by
A. Auxins.
B. Gibberellins.
C. Ethene.
D. Cytokinins.

29. During locomotion in an earthworm, when the circular muscles contract the;
A. longitudinal muscles contract.
B. longitudinal muscles become stretched.
C. chaetae are extended.
D. pressure of coelomic fluid reduces.

30. Which of the following hormones stimulates the liver to synthesize bile rich in hydrogen carbonate?
A. Gastrin.
B. Cholecystokinin.
C. Secretin.
D. Insulin.

31. The proportion of a recessive allele in a gene pool is 0.1, what is the proportion of the population with the dorminant allele?
A. 0.36
B. 0.9
C. 0.18
D. 0.99

32. When small seeds are sown too deep in the soil, their seedlings may fail to emerge because they.
A. are suppressed by soil during upward growth.
B. do not get enough water.
C. exhaust their food reserves before emerging.
D. do not get enough air.

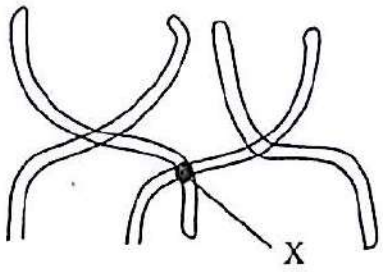
33. Which one of the following is **NOT** a trend in seral succession?
A. Increase in the proportion of woody parts of plants.
B. Increase in the ratio of respiration to photosynthesis.
C. Increase in the proportion of leaves to bark and wood.
D. Decrease in the proportion of herbaceous plants compared to other plants.

34. Sexual reproduction is important for evolution because
A. it introduces new genotypes in a population.
B. it brings about population explosion.
C. more offsprings are produced that survive to adult hood.
D. more offsprings are produced to replace the old ones.

35. Digestion of fats is NOT possible in the human stomach because
A. lipases become active within a narrow range of pH.
B. pH of the stomach is too low for lipases to act on fats.
C. bile salts that emulsify fats are absent in the stomach.
D. fat digestion is only possible in the duodenum.

36. Figure 4 below shows the behavior of chromosomes during melosis

Fig. 4



The region marked X represents
A. Chiasmata.
B. Non sister chromatids.
C. Homologous chromosomes.
D. Sister chromatids.

37. During the process of photosynthesis in the Z – scheme, the reaction centre of chlorophyll P680 is reduced with electrons that originate from
A. Water.
B. NADPH.
C. P700.
D. Ferredoxin.

38. Which one of the following situations is likely to have no immediate effect on body temperature?
A. Increase in environmental temperature.
B. acclimatization.
C. Release of thyroxine.
D. Perspiration.

Turn Over

39. If genes C and D are on the same pair of homologous chromosomes and exhibit recombination, the number of phenotypic types from a cross of two individuals heterozygous for both genes will be;

A. one.
B. two.
C. three.
D. four.

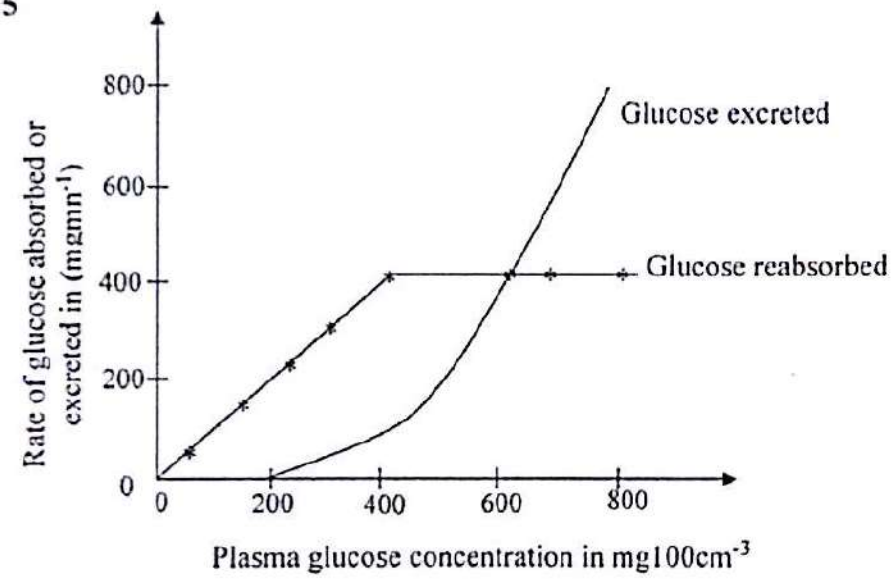
40. Which one of the following will be virtually absent in a highly industrialised area?

A. Lichens.
B. Bryophytes.
C. Algae.
D. Ferns.

SECTION B (60 MARKS)

41. Figure 5 below shows the rate of glucose reabsorption and excretion from a mammalian kidney in relation to the glucose concentration in the plasma.

Fig. 5



a) From the graph, compare the rate of glucose reabsorbed with that excreted.

(04 marks)

b) Explain the shape of the curve for glucose reabsorption when the plasma glucose concentration is

i) between 0 to 200mg100cm^{-3} (02 marks)

ii) over 400mg100cm^{-3} (01 mark)

c) In which part of the nephron is glucose reabsorbed? (01 mark)

d) Explain why glucose may appear in urine of an individual. (02 marks)

a) Define the term absorption spectrum. (01 mark)

b) State two;

i) evidences that show that photosynthesis is a two stage process.(02 marks)

ii) roles of the light dependent stage during carbon dioxide fixation. (02 marks)

c) Describe the Hatch-slack pathway. (05 marks)

43. Figure 6 below shows the relationship between the levels of prothoracicotrophic hormone (PTTH) or brain hormone in the brain and in the blood of a silkworm first at 3^0C and later transferred to a temperature of 25^0C with time of its development from pupa to adult. Study the figure carefully and use it to answer the questions that follow.

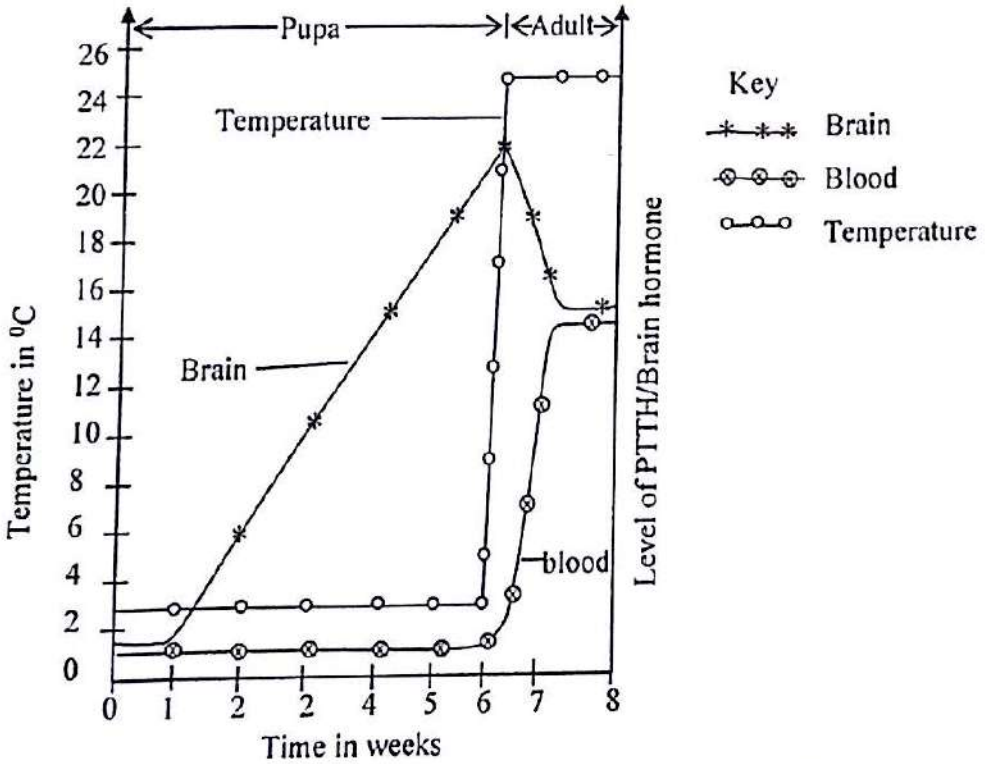


Fig. 6

a) Compare the levels of PTTH or brain hormone in the brain and blood of silkworm during the study period. (04 marks)

b) Account for the relationship between the levels of PTTH in the brain and blood of the silkworm during its development from pupa to adult. (05 marks)

c) State any one significance of growth and development in organisms. (01 mark)

44. a) What is meant by the following ecological terms.

i) Biomass (02 marks)

ii) Productivity (02 marks)

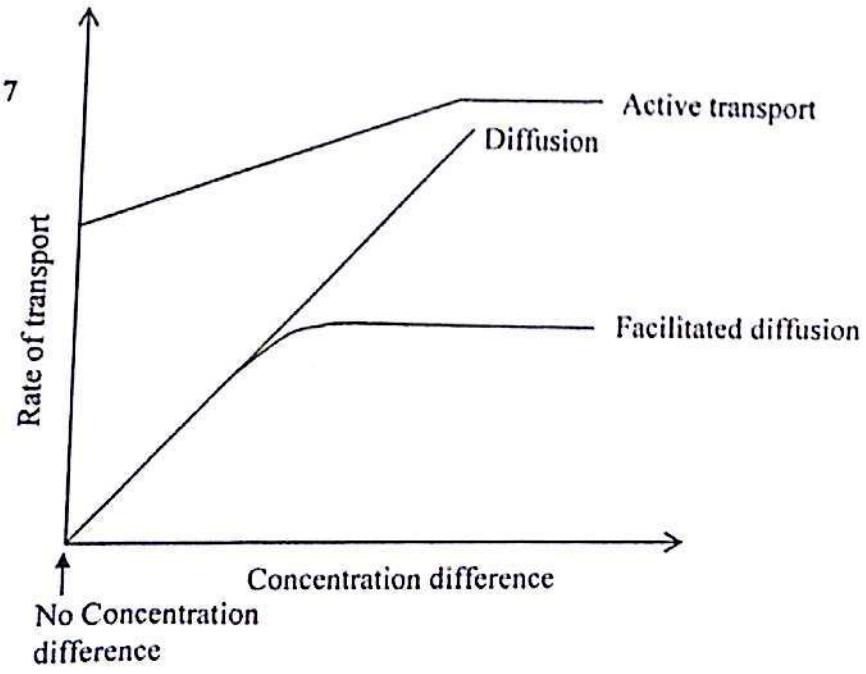
b) State two advantages of using energy to determine the number of organisms at different trophic levels in an ecosystem. (02 marks)

c) Explain the advantages a primary consumer has over a higher consumer (02 marks)

d) In an ecological study to determine the population of fish in a pond, 200 fish were captured, marked and released back into the pond. After three weeks, a second capture of 250 fish was made of which 100 fish were marked. Calculate the population of fish in the pond. (02 marks)

45. Figure 7 below shows the effect of concentration difference on the rate of transport of ions on either side of the cell membrane for three different types of transport. Study the figure carefully and answer the questions that follow;

Fig. 7



a) Explain the rate of transport of ions with changes in concentration difference for facilitated diffusion. (03 marks)

b) Explain the difference in the rate of transport of ions for active transport, diffusion and facilitated diffusion at no concentration difference. (04 marks)

c) Suggest what will happen to the rate of transport for active transport if a respiratory poison like potassium cyanide was added? Give a reason for your answer. (02 marks)

d) State two other factors that would affect the rate of transport of substances across cell membranes other than those mentioned above. (02 marks)

46. a) Distinguish between phenotype and genotype. (02 marks)

b) In guinea pigs, there are two alleles for hair colour, black and white and also two alleles for hair length, short and long. In a breeding experience all the F_1 phenotypes produced from a cross between pure breeding, short black-haired and pure breeding long white-haired parents had short black hair.

i) With a reason, state which alleles are dominant? (02 marks)

Allele/s;

Reason;

ii) Using suitable genetic symbols, determine the expected proportions of F_2 phenotypes. (06 marks)

END