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

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P530/1
BIOLOGY
PAPER 1
2 1/2 hours

WAKISSHA

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.

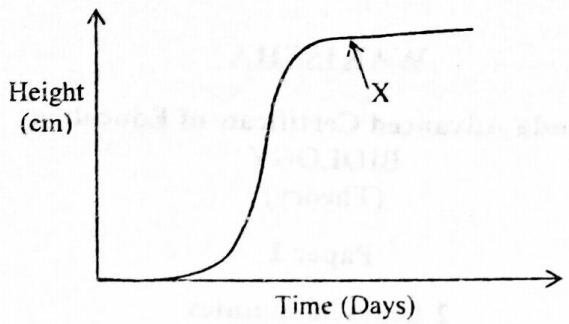
FOR EXAMINERS' USE ONLY			
SECTION		MARKS	Examiners' initials & No.
Section A:	1- 40		
Section B:	41		
	42		
	43		
	44		
	45		
	46		
TOTAL			

SECTION A (40 MARKS)

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

1. In triploblastic animals the mesoderm
   A. separates the jelly-like mesoglea.
   B. lines the gut
   C. gives rise to most of the individual's organs.
   D. allows free movement of the animal.

2. The figure shows the effect of increase in light exposed to maize seedlings that were placed in the dark for four days and then exposed to continuous light



After point X;
   A. Cells enter the resting phase before mitosis.
   B. Cell division has ceased.
   C. Cells have matured and incapable of elongating.
   D. Seedling growth inhibited by continuous light

3. When one of the following is the immediate source of energy for DNA replication?
   A. Hydrolysis of ATP
   B. Oxidation of reduced NAD
   C. Hydrolysis of nucleotides
   D. Breakage of hydrogen bonds.

4. Fresh water fish maintain water balance through
   A. drinking water.
   B. excreting a hypotonic urine.
   C. excreting salts across their gills.
   D. reversing the activity of the chloride pump.

5. Which of the following sequences represents the action of nitrifying bacteria?
   A. Ammonium ⟶ nitrite ⟶ nitrate
   B. Ammonium ⟶ nitrate ⟶ nitrite
   C. Nitrite ⟶ Nitrate ⟶ ammonium
   D. Nitrite ⟶ ammonium ⟶ nitrate

6. The reaction rate of salivary amylase with starch decreases as the concentration of chloride ions is reduce. This is because the chloride ions are
   A. Co-enzymes
   B. Competitive inhibitors
   C. Cofactors
   D. Allostene inhibitors

Pressure which tends to force water out of a cell is called.

A. Osmotic potential.
B. Turgor pressure.
C. Water potential.
D. Pressure potential.

8. A transverse section of an unnamed plant when examined under a microscope was found to have a epidermic with poorly developed cuticle, a wide cortex with large inter cellular air space and a small stele towards the center. The plant is most likely

A. hydrophyte.
B. xerophyte.
C. mesophyte.
D. halophyte.

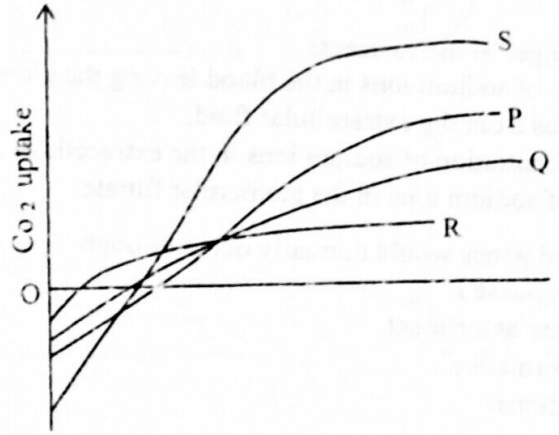
9. Which one of the following biological processes does not utilise respiratory energy?

A. Loss of water from the stomata.
B. Mineral salt absorption.
C. Synthesis of cellulose.
D. Meiosis.

10. At what stage in the life cycle of a moss does meiosis occur?

A. Germination of spores.
B. Formation of spores.
C. Formation of gameta.
D. Gametophyte stage.

11. The figure shows the rate of carbon dioxide uptake and release by four plants at different light intensities.



Which of the above plants would survive well under forest canopy?

A. S
B. P
C. Q
D. R

12. The most important form of learning in the early stages of an animal's life is

A. habituation.
B. imprinting.
C. insight.
D. exploratory.

Turn Over

13. Which of the following does **not** occur during hormonal control of breathing?
    A. Cerebral cortex allows voluntary control over breathing.
    B. Vagus nerve carries impulses from the respiratory center to stretch receptors to stimulate inspiration.
    C. Stretch receptors in the bronchioles monitor the amount of lung inflation.
    D. Impulses from chemoreceptors in the aorta stimulate the respiratory center to increase rate of inspiration.

14. A certain gene in a bacterium codes for a polypeptide that has 120 amino acids. The number of nucleotides needed to code for this polypeptide is
    A. 30
    B. 40
    C. 360
    D. 480

15. Colchine disrupts microtube assembly. Which of these processer would be most affected by colchine?
    A. Photosynthesis
    B. Replication
    C. Movement of chromosomes to the pole during mitosis.
    D. Active transport by membrane proteins.

16. A filamentous organism with a cell wall but no chloroplasts was identified in decomposing organic matter. This organism belongs to kingdom;
    A. Prokaryote
    B. Plantae
    C. Protista
    D. Fungi

17. The counter current exchanger in the vasarecta
    A. raises concentration of sodium ions in the blood leaving the kidney.
    B. removes sodium ions from the extracellular fluid.
    C. maintains high concentration of sodium ions in the extracellular fluid.
    D. increases amount of sodium ions in the glomerular filtrate.

18. Recombination of unlinked genes would normally occur through
    A. crossing over in prophase I
    B. random chromosome assortment.
    C. failure of spindle formation
    D. random gene mutations.

19. Which of the following sets of body parts possesses joints capable of bearing heavy loads?
    A. Shoulders, elbows and hips.
    B. Elbow, knees and fingers
    C. Wrists, elbows and hips
    D. Ankles, shoulders and fingers

20. Contraction of muscles in the uterine wall and breasts is stimulated by;
    A. Progesterone
    B. Oestrogen
    C. Prolactin
    D. Oxytocin

If along day plant has a critical night length of 9 hrs, which of the following 24 hrs cycle would prevent flowering?

A. 16 hours light and 8 hours of darkness.
B. 4 hours light, 8 hours darkness followed by 4 hours light and 8 hours of darkness.
C. 14 hours light and 10 hours of darkness.
D. 8 hours light followed by flashes of darkness and light each for 8 hrs.

22. The first heart sound is produced at the;

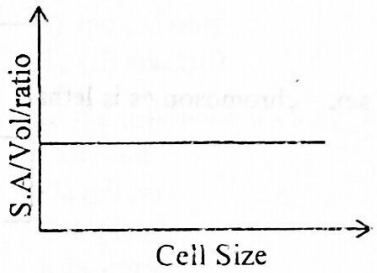
A. beginning of systole.
B. end of systole.
C. beginning of diastole.
D. end of diastole.

23. The Quadrat as a method of sampling is not suitable for estimating the population of;

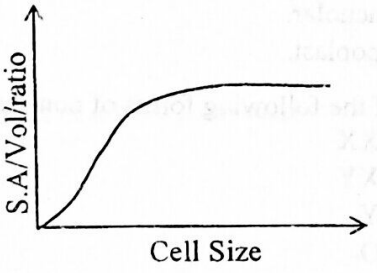
A. linchens on a tree trunk.
B. slow moving invertebrates.
C. soil organisms.
D. flying invertebrates.

24. Which of the following graphs shows how surface area to volume ratio changes with increase in size.

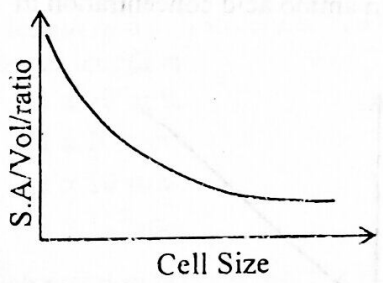
A.



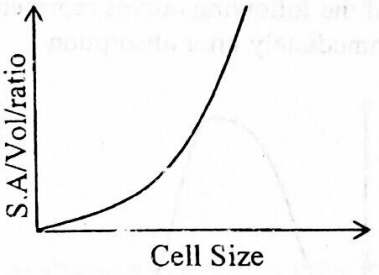
B.



C.



D.



25. The absorption of amino acids after eating a heavy proteineous meal is aided by

A. diffusion and active transport.
B. osmosis and diffusion.
C. diffusion and pinocytosis.
D. active transport only.

26. The primary role of human chorionic gonadotrophin in pregnancy is

A. maintenance of the corpus luteum.
B. to reduce oestrogen levels.
C. to develop the foetus.
D. increase oestrogen levels.

27. An enzymatic reaction of the type
ATP + D – hexose ⟶ ADP + D – hexose biphosphate is an example of;
A. Hydrolysis
B. Transfer
C. Isomerisation
D. Synthetase

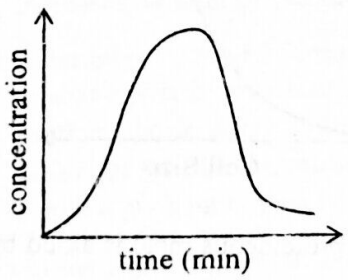
28. The first division of meiosis differs from that of mitosis in that un meiosis
A. nucleolus disappears.
B. spindle is formed.
C. centrioles move to opposte poles of nucleus.
D. homologous chromosomes associate to form bivalents.

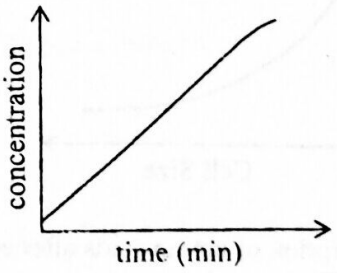
29. Algae with a smaller biomass compared to large trees may have the same productivity because
A. energy is locked up in the dead xylem tissue of a tree.
B. algae have a high turn-over rate.
C. algae have a high reproductive rate.
D. rate of death in trees is higher.

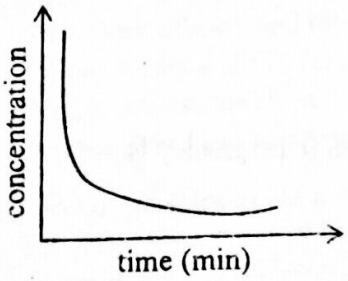
30. The pathway that offers least resistance to water movement is;
A. Symplast.
B. Cytoplasmic.
C. Vacuolar.
D. Apoplast.

31. Which of the following forms of non-disjunction of sex – chromosomes is lethal?
A. XXX
B. XXY
C. OY
D. XO

32. Which of the following curves represent a change in amino acid concentration in blood immediately after absorption

A.


B.


C.


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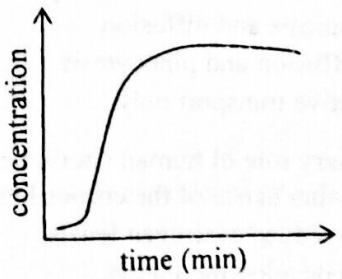

Regions of the Plasma membrane with higher concentration of cholesterol molecules are;

A. more fluid than the surrounding membrane.
B. more rigid than the surrounding membrane.
C. are able to move from the inside to the outside membrane.
D. detach from the plasma membrane and clog arteries.

34. Protein synthesis will not occur in a cell lacking

A. Nucleoli and ribosomes.
B. Ribosomes and nucleoplasm.
C. Nuclei and nucleoplasm.
D. Endoplasmic reticulum.

35. The formation of a variety of structures of protein is aided by the following combination of bonds:

(i) peptide bonds
(ii) hydrogen bonds
(iii) ionic bonds

Which of the combinations of bonds results in the primary structure of the protein?

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

36. Which of the following does <u>not</u> always form part of a bacterium cell?

A. Cell wall
B. Flagellum
C. Cytoplasm
D. Ribosomes

37. The length of a cell structure on a drawing is 6mm, under magnification of X 600. Its actual length is

A. $1 \times 10^{-1}\mu m$.
B. $1 \times 10^{0}\mu m$.
C. $1 \times 10^{1}\mu m$.
D. $1 \times 10^{2}\mu m$.

38. Which reaction taken place at a higher rate in an alveolus than active muscles?

1. Carbon dioxide + water ⟶ carbonic acid
2. Carbon dioxide + haemoglobin ⟶ carboxyhaemoglobin
3. Haemoglobin + hydrogen ion ⟶ haemoglobinic acid
4. Hydrogen carbonate ions + hydrogen ions ⟶ carbondioxide + water

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

39. Some soil borne fungi cause wilting in crop plants by growing within xylem vessels. Which process is directly affected by the fungi?

A. Cohesion between water molecules.
B. Development of root pressure.
C. Mass flow during translocation.
D. Uptake of water by root hair cells.

40. Which of the following is a disadvantage of chitin on the arthropod exoskeleton?

A. Toughness
B. Lightness
C. Flexibility
D. Permeability to water

SECTION B (60 MARKS)

41. (a) What is meant by the term osmoregulation? (2 marks)

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(b) State three functions of osmotive control in animals. (3 marks)

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(c) Describe the role of the following in the regulation of salt and water content of the body.

(i) Aldosterone (3 marks)

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(ii) ADH (2 marks)

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42. Describe the importance of the following during the course of evolution of animals.

(a) (i) Development of a body cavity. (3 marks)

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(ii) Metameric segmentation (2 marks)

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(b) Explain why land animals unlike aquatic ones evolved.

(i) Lungs; (3 marks)

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(ii) Internal fertilization; (2 marks)

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43. Describe the state of the voltage – gated ion channels during the;

(a) (i) resting state (2 marks)

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(ii) At the beginning of depolarisation (2 marks)

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(iii) the beginning of repolarisation (2 marks)

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(b) State four differences between a myelinated and a non-myelinated nerve fibre. (4 marks)

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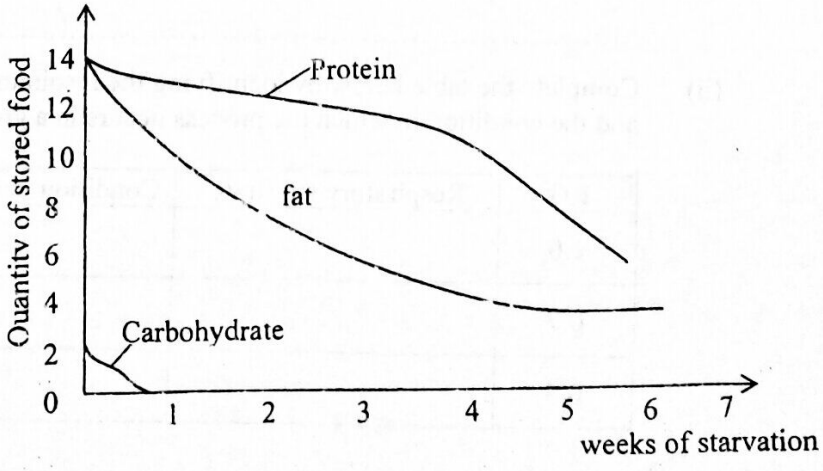
44. The fig shows the effect of starvation on the quantities of stored foods in a human body.



(a) Explain the changes in the quantities of stored food in the body.

(i) Carbohydrates (3 marks)

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(ii) Fats (4 marks)

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(iii) Proteins (3 marks)

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45. (a) (i) What is meant by the term respiratory quotient? (1mark)

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(ii) Complete the table below by identifying the respiratory substrate in use and the condition in which the process occurs in a green plant.

RG	Respiratory substrate	Condition in which process occurs
1.0		
0.7		
0.5		

(3 marks)

(b) Explain the possible effects of a decrease in environmental temperature on the rate of gas exchange in;

(i) A well illuminated foliage leaf. (3 marks)

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(ii) A small animal. (3 marks)

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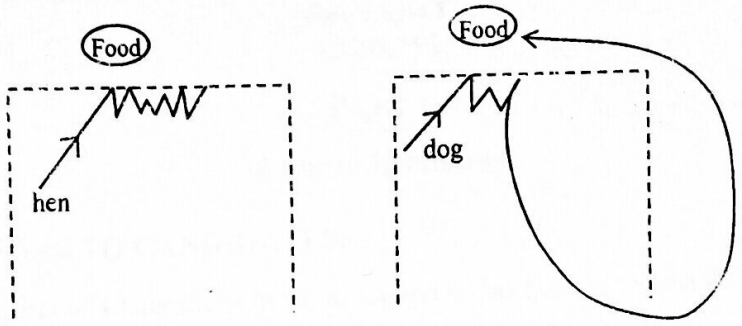
46. The figures show the response by a hen and a dog towards a source of food. Each was first starved and placed separately in transparent wire netting left open at one end and food placed outside the net.



(a) (i) State the form of behavior shown by each animal. (1 mark)

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(ii) State **three** characteristics of the behavior shown in the figure. (3 marks)

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(b) Explain the behavioral response shown by each animal

(i) Hen (3 marks)

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(ii) Dog (3 marks)

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END