NAME…………………………………………….. INDEX NO………………….......................

231/2   CANDIDATE'S SIGN…………..…………….
BIOLOGY
PAPER 2   DATE………..…………………………………
(THEORY)
TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

- Write your **name**, **index number** in the spaces provided above.
- **Sign** and write the **date** of examination in the spaces provided above.
- This paper consists of **TWO** Sections; **A** and **B**.
- Answer all the questions in Section **A** in the spaces provided.
- In Section **B** answer question **6 (Compulsory)** and either question **7** or **8** in the space provided after question **8**.
- Check to ascertain that all pages are printed and that no questions are missing.
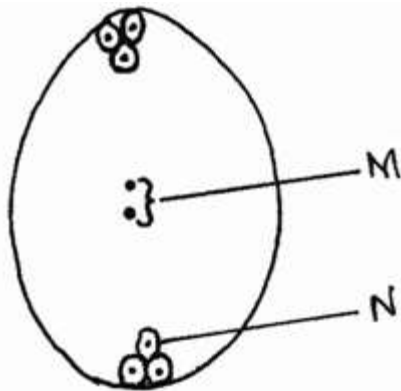
FOR EXAMINER'S USE ONLY:

Section	Question	Maximum Score	Candidate's Score
A	1	5	
	2	8	
	3	8	
	4	10	
	5	9	
B	6	20	
	7	20	
	8	20	
Total Score		80	

Answer all the questions in this section in the spaces provided:

1.   Below is a diagram of a structure found in plants?
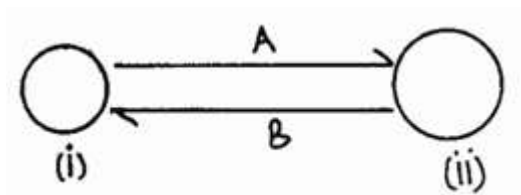

(a)   (i)   Identify the structure.   (1mk)

_____

(ii)   Name the parts labelled **M** and **N**.

M _____   (1mk)

N _____   (1mk)

(b)   Explain why cross-pollination is more advantageous to a plant species than self-pollination.
                                                                                (2mks)

_____

_____

_____

_____

2.   The diagram below represents two states of blood vessels in human skin under two different environmental conditions.

(a)   Identify process **A** and **B**.   (2mks)

A _____

B _____

(b)   What environmental conditions would make the vessel to be in the state (i)?   (1mk)

_____

(c)   Under certain conditions, carbon (IV) oxide concentration in the blood of mammals rises above normal levels. State **two** physiological changes that occur to bring carbon (IV) oxide level back to normal.

_____

_____

_____

_____

(d)   Why does a fresh wound bleed more in hot weather than in cold weather?   (1mk)
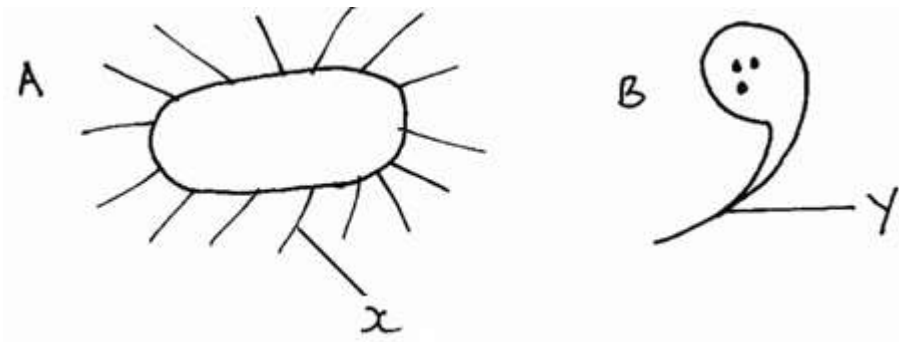
_____

_____

_____

(e)   A certain organ **R** was surgically removed from a rat. Later a drastic increase in glucose level was observed in the blood. Substance **S** was injected into the animal's blood. The whole process reversed.
        Identify:
        (i)   Organ **R**. _____   (1mk)

        (ii)   Substance **S**. _____   (1mk)

3.   The diagrams below illustrate two common bacteria **A** and **B** that causes typhoid and cholera respectively in humans.

(a)   (i)   Identify bacteria **A** and **B**.   (2mks)

                A _____

                B _____

        (ii)   Name the kingdom to which they belong.   (1mk)

                _____

(b)   (i)   Name the structures labelled **X** and **Y**.   (2mks)

                X _____

                Y _____

(ii)   Suggest the role of structures **X** and **Y**.   (1mk)

_____

(c)   State **two** adaptive features of organism **B**.   (2mks)

_____

_____

_____

_____

4.   The table below shows the number of leopards and impala in a grassland park over a period of
       six years.

Time in years	1	2	3	4	5	6
Number of impala	360	498	546	216	120	72
Number of leopards	11	17	25	7	3	2

(a)   (i)   What was the average number of impala in the park during the six years?   (2mks)

_____

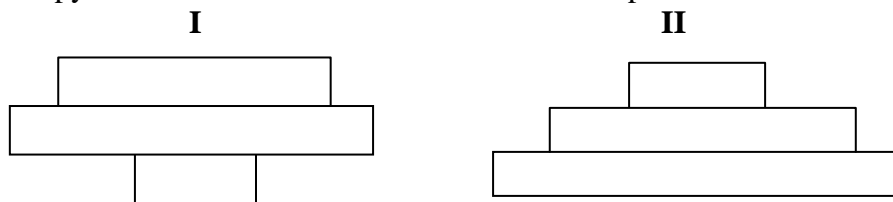(ii)   Account for the decrease in the number of leopards between the 4th and 6th year. (4mks)

_____

_____

_____

_____

(b)   Identify the trophic level occupied by
         (i)   Leopards.   (1mk)

_____

(ii)   Tick feeding on the leopard.   (1mk)

_____

(c)   The two pyramids shown below were obtained in the park.

                 I   **II**

Identify each type of pyramid.   (2mks)

I _____

II _____

5.   A normal man has children with a haemophilia woman. Their son marries and has children with
      a woman who carries the gene but does not suffer from the disorder.
      (a)   (i)   Carry out a genetic cross to show the percentage of the sons who are haemophiliac.
                    Use letter H to demote the gene for lack of haemophilia.   (5mks)

              (ii)   Why do most men suffer from haemophilia than women?   (2mks)

              _____

              _____

              _____

              _____

              (iii)   Identify two ways in which blood group inheritance in humans contradict mendel's
                      findings and conclusion in his monohybrid experiment.   (2mks)

              _____

              _____

              _____

              _____

Answer question **6 (Compulsory)** and **EITHER** question **7** or **8** in the spaces provided after question **8**.

6.   The relationship between oxygen concentration and sugar consumption in isolated roots of sorghum was determined. The results are shown in the table below. The loss of sugar and potassium uptake are in arbitrary units.

<div align="center">% Oxygen concentration</div>

	0	5	10	15	20	100
Sugar loss	15	20	42	45	45	48
Potassium gain	5	55	70	73	75	70

(a)   Plot graphs of sugar loss and potassium gain against percentage of oxygen concentration in the same axis.   (6mks)

(b)   Name the process by which potassium is taken in by root hairs. Give reasons for your answer.

Process: _____   (1mk)

Reasons.   (1mk)

_____

_____

_____

_____

(c)   Account for the sugar loss and potassium gain at:
(i)   0% oxygen concentration.   (2mks)

_____

_____

_____

_____

(ii)   Between 5% and 20% oxygen concentration.   (2mks)

_____

_____

_____

_____
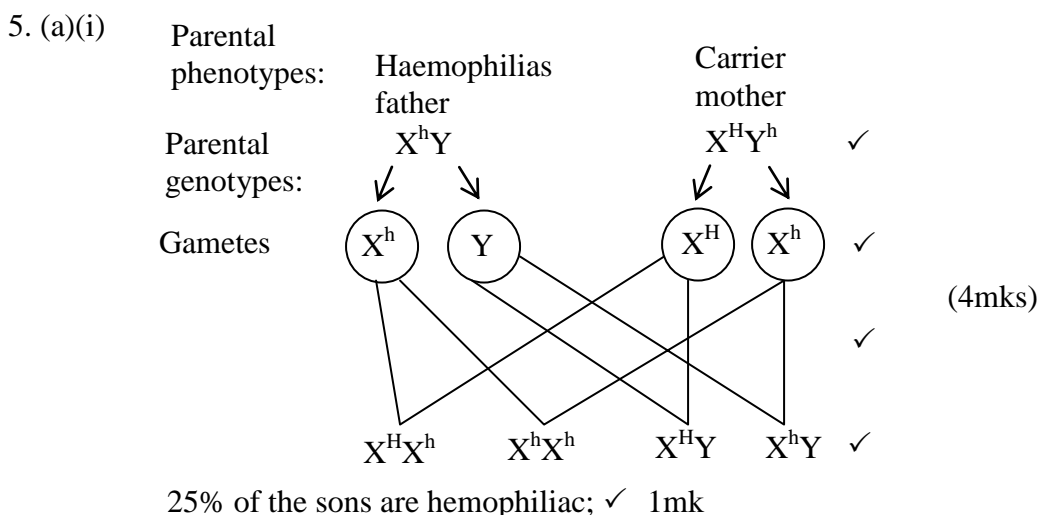
(d)   Apart from oxygen concentration, give **two** other factors that are necessary for the above process.   (2mks)

_____

_____

(e)   State **two** ways in which you can stop the above process from taking place.   (2mks)

_____

_____

(f)   Name **two** main areas in the mammalian body where the above process is involved. (2mks)

_____

_____

7.   Describe the various evidence which support the theory of organic evolution.   (20mks)

8.   Describe the functions of the various components of the mammalian blood.   (20mks)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

1.(a)   (i) Embryosac; 1mk
        (ii) M - Polar nuclei; 1mk
           N - Egg cell; 1mk
  (b)   It brings about variation; which enables plants to survive better. 2mks

2.(a)   A Vasodilation;
        B Vasoconstriction;   2mks
  (b)   Cold / Low temperature;   1mk
  (c)   - Increased rate of heart beat / increased rate of blood circulation ;
        - Increased rate of breathing / deep inspiration and expiration;   2mks
  (d)   During hot weather superficial blood vessels dilate; thus more blood flows through
        the skin; 1mk
  (e)   (i) Organ R - Pancreas
        (ii) Substance S - Insulin   2mks

3.(a)   (i) A - <u>Salmonella</u> <u>typhi</u>;
          B - <u>Vibrio</u> <u>cholerae</u>;
        (ii) Monera;   1mk
  (b)   (i) X Cilia ;
          Y Flagellum; deny if plural
        (ii) Locomotion   1mk
  (c)   - Form cysts to survive adverse conditions outside the host;
        - Secrete the enzyme mucinase which digest the lining of the host;
        - Has flagellum for locomotion;   any two   2mks

4. (a)   (i) 1812/6; = 302;   2mks
        (ii) Decrease in impala / prey; hence starved to death emigration / poaching / immigration;
          leading to increased competition;
         Disease epidemic;
         Pollution / human activities;   any 4   4mks

  (b)   (i) Secondary consumer;   1mk
        (ii) Tertiary consumer;   1mk
  (c)   I Pyramid of numbers;
        II Pyramid of biomass;   2mks

5. (a)(i)

Parental phenotypes: Haemophilias father   Carrier mother

Parental genotypes: X^hY X^HY^h ✓

Gametes X^h Y X^H X^h ✓

                        (4mks)

              ✓

X^HX^h X^hX^h X^HY X^hY ✓

   25% of the sons are hemophiliac; ✓   1mk

  (ii) The g ene for hemophilia is located on the X-chromosome which is inherited from the

mother; and chromosome Y carries no gene for hemophilia making the gene for
hemophilia to express itself fully;   2mks
(iii) - Blood groups are determined by multiple alleles / three genes unlike in Mandel's
       experiments where traits are determined by an allele / pair of genes;   1mk
     - Monohybrid inheritance has no case of incomplete dorminance / co-dominance; 1mk

6. (a) Plotting the points - @ curve ½mk   = 1mk
        Joining the points - @ curve ½mk   = 1mk
        Labeling of X and Y axes - @ ½mk   = 1mk
        Scale on X and Y axes, @ ½mk   = 1mk
        Identify/labeling the curves @ ½mk = 1mk
                                       Total   6mks

(b)   Process; Active transport;   = 1mk
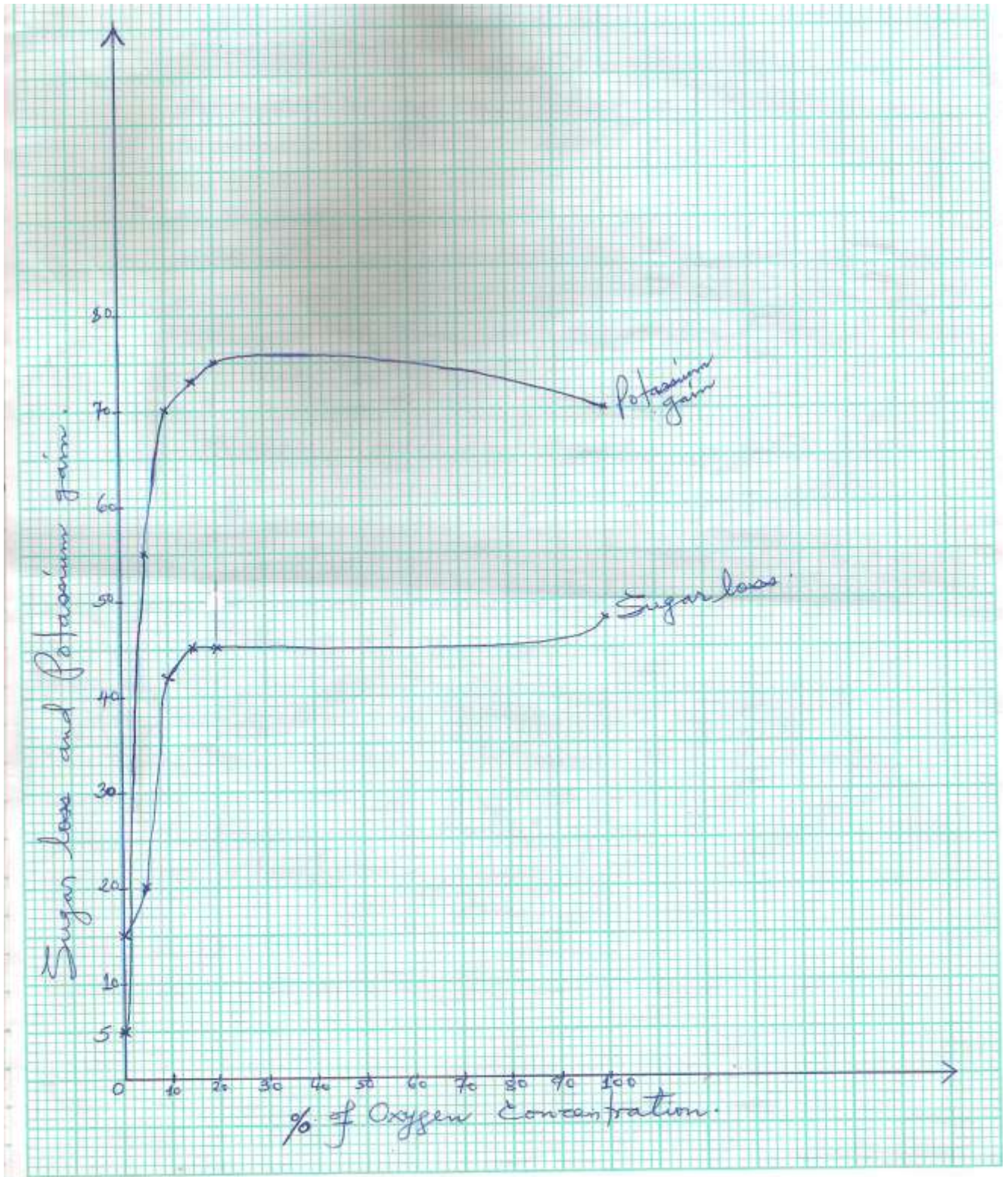
Reasons: Movement of materials occur against a concentration gradient; the process requires energy; as a result of oxidation of sugar / glucose being consumed by use of oxygen; 3mks

(c) (i) Rate of active transport slow ; low oxygen concentration leads to less potassium ions absorbed.   2mks

(ii) Rate of active transport is high; the, higher the oxygen concentration, the more the potassium ions absorbed; 2mks

(d) - Glucose concentration;
- Temperature;   2mks

(e) - Increase in temperature;
- Introducing enzyme inhibitors;   2mks

(f) - Kidney tubule;
- Ileum;

- Alimentary canal;   2mks

7. - Comparative anatomy / taxonomy - members of the same group show structural similarities; as they have similar structures / organs performing same functions;
- Comparative embryology; - chordate embryosare morphologically similar /same features; suggesting they have a common origin / ancestry;
- Geographical distribution; - present continents are thought to have been a large land mass joined together; as a result of continental drift ; isolation occurred bringing about different patterns of evolution; acc examples.
- Fossil records / palaeontology; - these are remains of organisms preserved in naturally occurring materials for many years; they show morphological changes of organisms over along period of time; Acc examples.
- Comparative serology / physiology; - antibody - antigen reaction / Rhesus factor / blood groups; reveal some relationship among some organisms; e.g. primates.
- Cell biology / cytology; occurrence of cell organelles e.g. mitochondria, ribosomes etc in all cells; suggest a common anciently;   max 20mks

8. Red blood cells; carry oxygen; to all parts of the body / from lungs / to the tissues; Transport carbon (IV) oxide; to lungs / from tissues (award only once for direction of either CO_2 or O_2) Platelet /thrombocytes; phagocytes ; produce antibodies / Agglutinins / lysine; for defence against diseases; they also engulf foreign bodies; plasma; transports nutrients; hormones; heat; carbon (iv) oxide; nitrogenous wastes / urea; mineral ions; fibrinogen; baths the tissues allowing for exchange of materials;   20mks