FORM FOUR CLUSTER KCSE MODEL9

BIOLOGY PAPER 2 ANSWERS

SECTION A (40 Marks)

Answer all the questions

1. (a)
   i) Chloroplast;
   ii) Oxygen; Rej O2

   (b)

   i) Splits/breaks water molecules into oxygen and Hydrogen ions(atoms);
   ii) Provides Hydrogen ions (atoms) for the reduction of carbon (iv) oxide;

   Raw material; for photosynthesis;

   iii) Undergoes carbon (iv) oxide fixation; to form simple sugars. Reduced by Hydrogen ions to form simple sugars; Raw material; for photosynthesis.
   (c) -Directly utilized by the plant cells (respiration) to release energy;
   -Excess is convert to starch; and stored;

2. (a) Carbonic Acid/ Carbominohaemoglobin/Hydrogen carbonate;

   Rej – HCO_3^- formular rej Bicarbonate

   b)
   i) Water;
   Enzyme – carbonic anahydrase;
   Role – catalyses the reaction between carbon (iv) oxide and water to form (weak) carbonic acid;

   c) -Maintains PH of blood/prevents accumulation of acidity;
   -Hydrogen ions combines with Haemoglobin (to form Haemoglobinic acid);
   -It is faster; due to the catalytic effect of carbonic anhydrase;

   d) -Activates Thromboplastin/Thrombokinase; enzymes.
   -To neutralize Heparin/convert prothrombin to thrombin;

3. a)

   i) J – Plumule; L- Endosperm;

   ii) Hypogeal; germination

   iii) -Structure K – coleoptiles; protects/covers the plumule;

   -Structure M- Adventitious roots /fibrous roots;

   -For anchorage;

   -For absorption of water and dissolved mineral salts/ions;

b)

-Causes ripening of fruits;

-Causes falling of fruits;

-Stimulates formation of abscission layer;

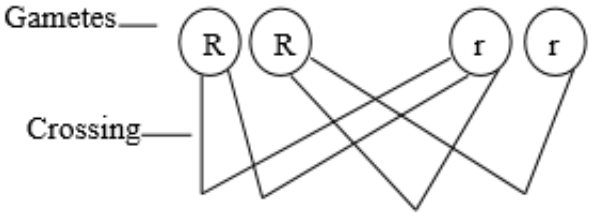
-Induces stem thickening by promoting cell division and differentiation at the cambium meristem;

-Promotes breaking of seed dormancy in some seeds;

-Promotes flower formation in pineapples;

4. (a) Parental phenotypes - Smooth Wrinkled

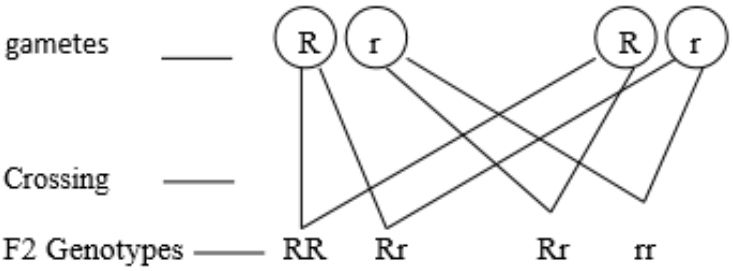
Parental genotypes - R R X r r ;



F_1(First Filial)germination- Rr Rr Rr Rr ;

Acc – Punnet Square

b)Parental genotype —— Rr X R r



Acc – Punnet square

Phenotypes Ration Smooth coasts: Wrinkled coats = 3:1

c) $\frac{1}{4} \times 14{,}640 ; = 3660 ;$

5.

a) i) Food web ;
ii) Green plants;
iii) Grass hoppers / Lizards /Snakes;

b) - Green plants ⟶ Grasshoppers ⟶ Snakes ⟶ Hawks;
- Green plants ⟶ Grass hoppers ⟶ Snakes ⟶ Domestic cats;
-Green plants ⟶ Grass hoppers ⟶ Lizards ⟶ Snakes;
- Green plants ⟶ Grass hoppers ⟶ Lizards ⟶ Domestic cats;
- Green plants ⟶ Mice ⟶ Domestic cats ⟶ Hawks;
Any two

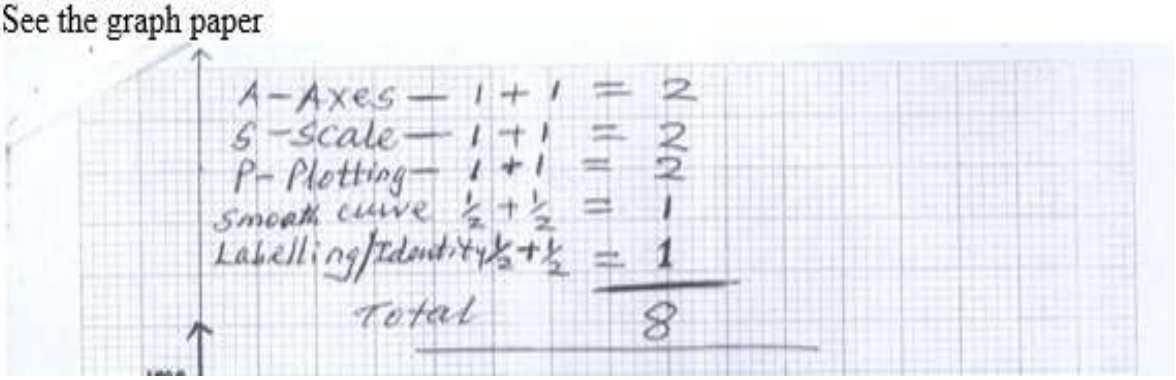
c) Insecta:
-Aves; acc Birds
Reptilia:
Mammalia ;
(Any three.

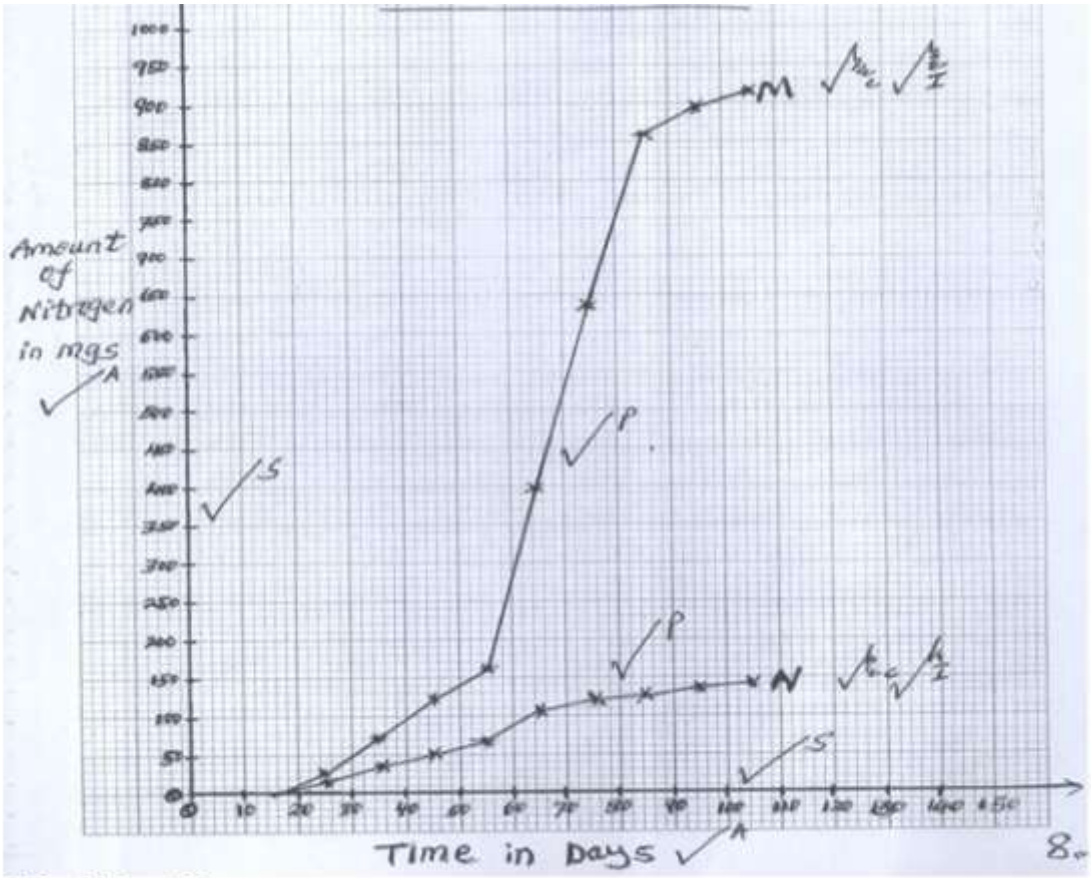
SECTION B (40 Marks)

Answer question 6 (compulsory and either question 7 or 8

6.

a) See the graph paper





b) $\frac{860-395}{20}=\frac{465}{20};=23.25mg/day;$

c) i) The higher the carbon (iv) oxide concentration/ content, the higher the uptake;

Acc – The converse.

ii) More CO2(g) in the air makes the seedlings to photosynthesize more;

-Hence more amino acids/proteins are formed; in the dark stage; why?

Formation of amino acids/proteins requires nitrogen;

c (i) is tied to c(ii)

d)

i) The concentration of nitrogen would remain constant;

ii) Despite decline in CO2(g); the Nitrogen already absorbed or taken up the plant will still remain;

d(i) is tied to d(ii)

e)

-By lightning; Reject lightening/Lighting

-By free living bacteria/micro-organisms; e.g clostridium, anabaena, chlorella, Nostoc, Blue-green algae.

-By Rhizobium (in the root nodules of leguminous);

-Acc- symbiotic Bacteria.

7. (a) (i) Temperature:-

-Reactions in photosynthesis are catalysed by enzymes;

-At optimum temperature photosynthesis proceeds faster;

-Below optimum temperature the rate of photosynthesis decreases because enzymes are in-activated by low temperatures/Above optimum temperatures the rate of photosynthesis decreases because enzymes are destroyed or denatured;

(ii) Chlorophyll concentration:-

-Chlorophyll traps energy from light for photosynthesis;

-The higher the chlorophyll concentration, the higher the rate of photosynthesis; Acc the converse.

b) In the mouth;

-Food is chewed; to increase surface area for enzyme activity; saliva (contain) salivary amylase or ptyalin; enzyme. Saliva (mixes with food and provides an alkaline; medium for the action of amylase/ ptyalin; enzyme.

-Salivary amylase/ptyalin acts on starch or amylase to maltose; In the duodenum;

-Food is mixed with bile; and pancreatic juice/Bile provides alkaline; medium for the activity of duodenal enzymes; and neutralizes acidic food/chime from the stomach;

-Acc sodium Hydrogen carbonate for bile.

-Rej sodium bicarbonate for bile.

-Pancreatic juice contains pancreatic amylase; which converts starch to maltose;

-In the Ileum; Reject Ilium.

-Epithelial cells in the ileum secrete succus entericus/interstine juice; which contain sucrose/invertase; enzyme which acts on sucrose and converts it to fructose and glucose;

-Lactose; which acts on lactose and converts it to galactose and glucose;

-Maltase; acts on maltose and converts it to glucose;

8. i) **" Struggle for existence"** is a concept (of Charles Darwin)based on natural selection; whereby individuals in any given population struggle for survival against environmental pressures;

ii) **" Survival for the fittest"** is a concept (of Charles Darwin) based on "Natural selection" whereby individuals in any given population struggle to acquire advantageous variations; to survive.

b)

-When comparing the form and structure of different organisms some groups show structural similarities; this suggests that the organisms have a common ancestral origin;

-Homologous structures; underwent divergent evolution; and adaptive radiation; this are structures of similar embryonic origin; but are modified to perform different functions; e.g.

-Pentadactyl timb in vertebrates; a basic pentadactyl (5- digits) structure is same; The forelimb in bats is modified for flight/Horse is elongated to enhance speed when running;

-Human beings for grasping/whale for swimming/mole for digging/zebra for running/Lizards for walking;

-Beaks; of birds show common embryonic descent/origin; but are modified for different functions; e.g. seed eaters/ flesh eaters/fruit eaters/nectar feeding/fish eaters or filter feeding/insect feeding; depending on size/shape (and) length; of the beaks.

-Feet; of birds accepts foot have common embryonic origin but modified for various habitats; and functions; e.g. webbed for wading/ heavy-clawed for tearing flesh/grasping twigs /ground scratching;

-Analogous structures; underwent convergent evolution; These structures had different embryonic origin; but got modified to perform similar functions; due to exploitation of similar environments e.g. wings; of birds and insects; are endoskeleton (pentadactyl) and exoskeleton in origin/eyes; of vertebrates and molluscs/octopus;

-Vestigeal structures; structures reduced in size and have ceased to function during the course of evolution; because they lost their original function; e.g appendix /tail/coccyx in man/pelvic girdle in whales;