FORM FOUR CLUSTER KCSE MODEL3

BIOLOGY PAPER 1 ANSWERS

SECTION A (40 Marks)

1. (a) (i) Root hair cell;

(ii) -Elongated; to increase surface area for absorption of water and mineral salts;

- Flexible to be able to penetrate through soil particles;

- Thin cell wall; for faster passage of water and mineral salts;

(b) Endodermis;

(c) L: Cortical cells/ cortex/ cortical parenchyma;

N: -Pericycle;

(d) Active transport; Accept diffusion;

2. (a)(i) Oxygen; Reject air. - Optimum temperature; Reject temperature alone;

- Light; - Presence of hormones;

(ii)Cotyledon; Reject endosperm;

(iii) Mass of the whole seedling includes the mass of the seed coat; Owtte;

(b) (i). Food in the food storage region is broken down // hydrolyzed; and transported to the growing regions of the plumule and radicles;

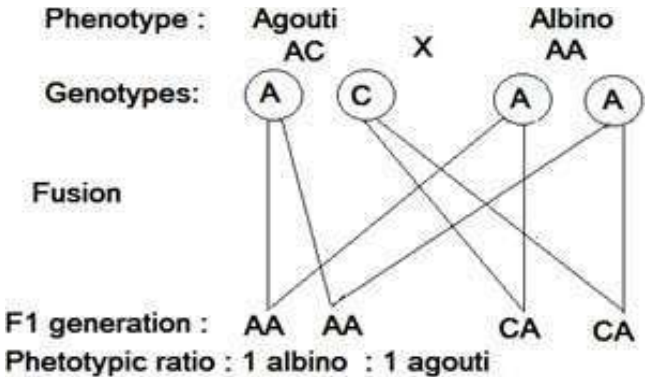
(ii). Food transported from the storage region is used in respiration; providing energy for synthesis of new cells leading to growth;

3. (a)Phenomena in which individuals heterozygous for a particular trait have a survival advantage over those that are homozygous for the trait

(b) Albinism; sickle cell anaemia;

(c) Mental retardation; flat nose; slit

(d)(i) Genetic cross;



(ii) Co-dominance;

4. (a) (i) 5: Urinary bladder;

8: Rectum;

(ii) 1: Site for production of ova // ova; secretes progesterone and oestrogen;

7: Secretes a plug of mucus which prevents entry of pathogens into the uterus during pregnancy;

(iii) Part 2:

- Tubular to allow for transportation of the ova towards the uterus;

- Have goblet cells that secrete mucus to lubricate the epithelium for easier transportation of ovum

/ zygote towards the uterus;

- Have smooth circular and longitudinal muscles that contract and relax to allow for propulsion of

the ovum / zygote towards the uterus;

- Ciliated epithelium to propel the ova or zygote towards the uterus;

(b) The remains of the Graafian follicle are reorganized to form corpus luteum; the corpus luteum

is then stimulated to start secreting oestrogen hormone;

5. (a) A: external intercostal muscles;

B: sternum;

C: diaphragm;

(b) (i) Inhalation;

(ii) Diaphragm is flattening;

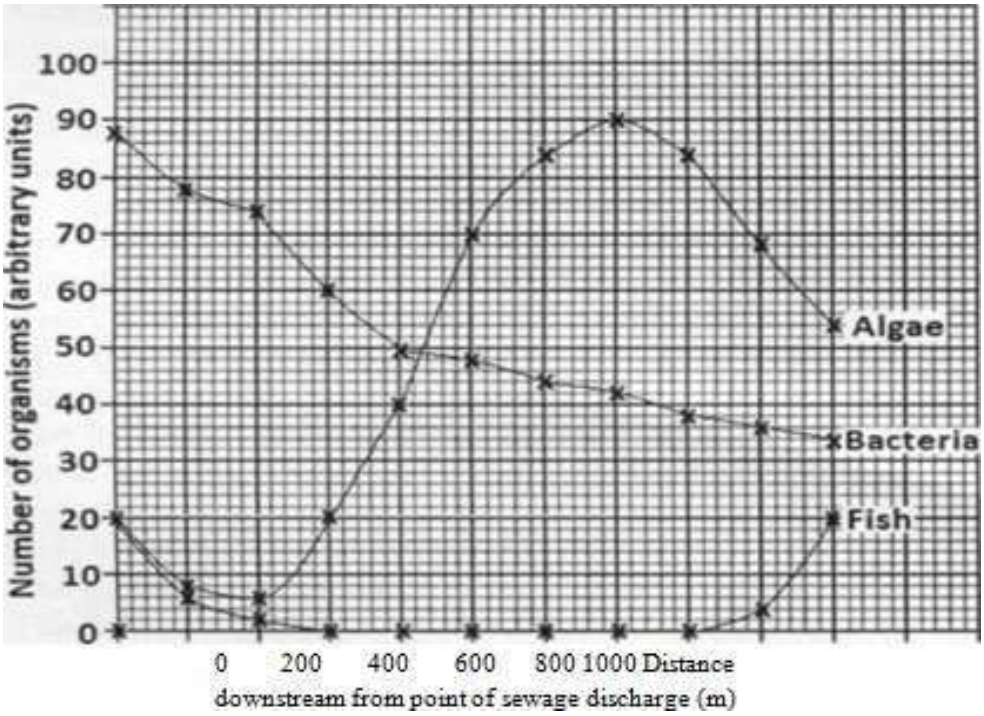
(c) A: Contracts;

B: Moves outwards and upwards;

C: Flattens;

SECTION B (40 Marks)

6. Graph: Number of organisms against distance downstream



(b) The concentration of dissolved oxygen decreased; after the point of entry up to 300 m downstream and then increases further downstream; aerobic bacteria uses dissolved oxygen to break down organic matter in sewage; as amount of organic matter in sewage decrease downstream so does the amount of oxygen needed for breakdown;

(c)(i) Initially the bacteria population increases; sewage contain a lot of bacteria and organ matter; bacteria breakdown organic matter and reproduce rapidly; population then decreases downstream as the amount of organic matter decrease downstream;

(ii) Decreases immediately after sewage discharge; organic matter in sewage reduces light

penetration hence reduced photosynthesis and growth of algae; Increases later downstream;

organic matter in sewage broken down providing excess nutrients leading to eutrophication; later decreases as the algae die due to excess competition leading to death of algae;

(iii) Drops sharply and all die within 300 m from point of discharge; decrease in concentration of oxygen leads to death of fish by suffocation; organic matter in sewage clogs gills of fish leading to their death; sewage have toxic chemicals which directly kill fish; fish reappears after 800 m from point of sewage discharge and thereafter increases; amount of organic matter in sewage has decreased hence increasing oxygen concentration; less solid matter to clog fish gills;

(d)Proper sanitation;Sewage must be purified before it enters the river; Education; to make people aware of proper waste disposal measures Research; - more efficient ways of treating sewage;

7. Blood reaches the kidney from the renal artery; the renal artery branches into renal arterioles, which further branches into the afferent arterioles; which drains into the glomerulus (glomerulus capillaries); enclosed in the Bowman's capsule; The afferent arterioles are wider than the efferent arterioles; causing higher pressures to develop in the glomerulus; this causes ultrafiltration of plasma into the Bowman's capsule; the liquid part of blood is filtered out, forming the glomerular filtrate; the filtrate contains more waste products (urea, uric acid, ammonium ions etc.); and some useful substances (glucose, amino acids, water and ions of sodium and chloride); The filtrate moves into the proximal convoluted tubules; where selective reabsorption of glucose, amino acids; and some water, and vitamins takes place; reabsorption involves active transport; and diffusion; some substances are secreted hence excreted into proximal convoluted tubule e.g. hydrogen, potassium and ammonium ions, some drugs and dyes The filtrate passes into the loop of Henle; where the sodium and chloride ions concentration in the surrounding tissues is raised; providing an osmotic mechanism for reabsorption of water; by osmosis; The excretory products (filtrate) with urea, uric acid, excess water and excess mineral salts pass into the distal convulted tubules; where the remaining useful substances, mainly water and salts of sodium, potassium and chlorine are reabsorbed; The filtrate passes into the collecting tubule; where further reabsorption of water occurs; excess water, urea, uric acid, excess ammonium, sodium and chloride ions; the main components of urine are removed through the ureter; to

the urinary bladder; urine is then released from the bladder out of the body; Through urine formation and removal the kidney excretes substances such as urea; uric acid; ammonia ions; excess water; excess mineral salts; etc.;

8. (a)

- When sound waves are trapped by the pinna, they are directed inwards into the auditory canal and then to the ear drum;

- Wax in the auditory canal trap dust particles and microorganisms in air;

- The sound waves cause the eardrum to vibrate with the same intensity as the sound waves;

thereby converting the sound waves to vibrations;

- The vibrating eardrum causes the ear oscicles (malleus, incus, and stapes) to vibrate in turn;

- The oscicles amplify and transmits the vibrations to the oval window (fenestra ovalis).

- The vibrations of the oval window are transmitted to the fluid (perilymph) in the cochlea i.e.

within the vestibular canal of cochlea;

- Vibrations of perilymph causes the reisnners membrane to vibrate; transmitting the vibrations into the median canal, containing another fluid, the endolymph;

- Vibrations of the endolymph in the median canal causes the basilar membrane to vibrate.

- The basilar membrane is joined to other parts of the organ of corti; which contains sensory hair cells;

- Vibrations of the basilar membrane brush the end of the sensory hair cells into the tectorial

membrane;

- This movement of the hair generates impulses in the sensory hair cells.

- The impulses are transmitted into the brain (cerebrum) via the auditory nerve;

(b)

Accommodation of distant object (far vision):

- The ciliary muscles relax

; - The suspensory ligaments contract and pulled tight;

- The lens then become thinner (less spherical);

- Light from the distant object is less refracted then focused on the forvea; and then interpreted in the brain; Accommodation of a close object (near vision).

- The ciliary muscles contract;

- The suspensory ligaments relax;

- The lens then become thicker (more spherical);

- Light from the close object is greatly refracted and focused on the forvea; and then interpreted in the brain;

Note - During accommodation the iris regulates the size of the pupil and hence the amount of lightentering the eye.

- Thus control of light entering the eye and accommodation in the eye occur together almost as similar events.