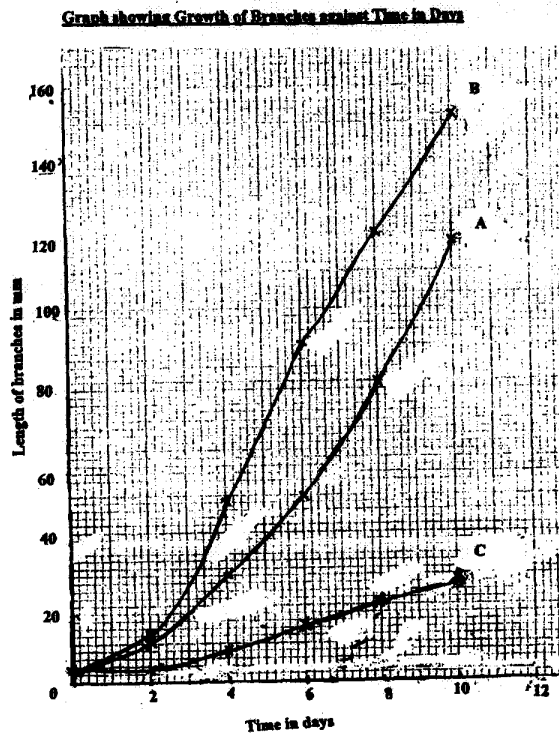


### 24.4.2 Biology Paper 2 (231/2)

1. (a) X: Femur.  
Y: Fibula.  
Z: Tibia. (3 marks)
- (b) (i) Synovial fluid.  
(ii) Lubrication of the joint. (2 marks)
- (c) Ligament. (1 mark)
- (d) Ball and socket joint allows movement in all places while the illustrated allows movement in one plane only. (1 mark)
- (e) Olecranon process. (1 mark)
2. (a) Albinism.  
Sickle cell anaemia.  
Haemophilia.  
Colour blindness. (Any 2 × 1 = 2 marks)
- (b) (i) Occurs when chromatid breaks at 2 places and when rejoining the middle piece rotates and joins in an inverted position.  
(ii) Occurs when a section of a chromatid breaks off and becomes attached to another chromatid of another chromosome. (2 marks)
- (c)
- Bb × bb

$\frac{2}{4} \times 100 = 50\%$
- (4 marks)
3. (a) Pyramid of numbers is a diagrammatic representation of organisms at each trophic level in a food chain while biomass is a diagrammatic representation of dry weight of organisms at each trophic level in a food chain. (2 marks)
- (b) Insufficient utilisation of food resource/wastage.  
Through respiration.  
Through death.  
Through excretion. (Any 3 × 1 = 3 marks)
- (c) Run two ropes parallel to each a metre apart;  
Counts of shrub are made between the two ropes at marked points/whole belt;  
Calculate area of belt transect; calculate for whole area. (3 marks)
4. (a) Root. (1 mark)
- (b) Presence of root-hairs.  
Presence of endodermis.  
Xylem star-shaped and at centre with phloem at arms of the xylem. (Any 2 × 1 = 2 marks)

- (c) J: Epidermis.  
K: Phloem.  
L: Xylem. (3 marks)
- (d) Absorption of water.  
Absorption of mineral salts. (2 marks)
5. (a) Amniotic membrane. (1 mark)
- (b) (i) Arteries; Veins; Capillaries. (2 marks)  
(ii) More food nutrients and oxygen in arteries and less food nutrients and excretory products in the veins. (2 marks)
- (c) Highly vascularised.  
Large surface area. (2 marks)
- (d) Cushion/absorbs shock. (1 mark)
6. (a)



- (b) (i)  $105 \pm 1$  (mm); (8 marks)  
(ii) 134 - 140 (mm). (1 mark)
- (c) **Graph A** (1 mark)  
The tip of the shoot which was removed contained Indole Acetic Acid (IAA) which causes apical dominance or Inhibits growth and develop more of lateral buds; hence, lateral buds sprouted and grew;
- Graph B** (1 mark)  
The gibberellic which was added on the cut promotes formation of lateral branches on stem; hence the fast growth of shoot B;

### Graph C

The shoot tip which remained intact contains IAA which inhibits growth and development of latest buds; hence no change in length of lateral buds. (6 marks)

- (d) Control. (1 mark)
- (e) Increase productivity. (1 mark)
- (f) Promote cell division; and cell elongation. (2 marks)

7. The afferent arteriole which is a branch of renal artery supplies blood to glomerulus; The efferent arteriole has a wider diameter than the afferent arteriole; which takes blood away from glomerulus. The difference in the diameter of the afferent and efferent vessels causes high pressure; leading to ultrafiltration of blood; The walls of the blood capillaries are one cell thick hence glucose, amino acids, vitamins, hormones, salts, creatine, urea and water filter into Bowman's capsule; to form glomerular filtrate; white blood cells, red blood cells, plasma proteins such as globulin and platelets are too large to pass through the capillary wall; hence remain in blood capillary; useful substances in the human body are selectively reabsorbed; back into the blood stream at the proximal convoluted tubule; The useful substances include amino acids, glucose, vitamins, hormones, sodium chloride and water; Many mitochondria found at the proximal convoluted tubule provide energy for reabsorption of these substances against a concentration gradient; The glomerular filtrate flows into the descending and then ascending of loop of henle; Water in the descending loop moves by osmosis into the blood capillaries; Sodium chloride is actively absorbed from the ascending into blood capillaries.

The glomerular filtrate flows into distal convoluted tubule; water is reabsorbed by osmosis from distal convoluted tubule into blood capillaries; The glomerular filtrate flows into collecting tubule from where, more water is reabsorbed into blood stream; Antidiuretic hormone influences the amount of water reabsorbed depending on osmotic pressure of blood; The glomerular filtrate from several collecting tubules now referred to a urine is emptied into collecting duct; The urine passes through pyramid, pelvis and ureter into bladder; where urine is stored for some time. The sphincter on urethra relaxes to allow urine to be released from the body. (20 marks)

8. Water is drawn into the root hair cells of osmosis; Due to the presence of dissolved substances in the cell sap of root hairs, the concentration of cell sap is greater than that of the surrounding solution in the soil/concentration gradient; This exerts a higher osmotic pressure, thus drawing the water molecules across the cell wall and cell membrane into the root hair cells;

More water drawn into the root hair cells dilutes the cell sap making it less concentrated than that in the adjacent cortex cell of the root; Due to osmotic gradient water moves from the adjacent cells to the next by osmosis; until it enters by xylem vessels located in the centre of the root; These xylem vessels of the root then conduct the water up into the xylem vessels of the stem into the leaves;

There is a force in the roots which pushes water up the stem. This force is known as root pressure and can be considerably high in some plants; Energy is essential in this process; In the xylem vessels, water would rise by capillarity; to some extent because the vessels are narrower, and there is a higher attractive force between the water molecules and the cell walls; The cohesive; and adhesive forces; are important in the maintenance of a continuous and an uninterrupted water column in the xylem vessels up the tree to the leaves;

Water vaporises from the spongy mesophyll cells their cell sap becomes concentrated than adjacent cells; This increases the osmotic pressure of the spongy mesophyll cells; As a result water flows into the cell from other surrounding cells which in turn take in water from xylem vessels within the leaf veins; This creates a pull/suction force; that pulls a stream of water from xylem vessels in the stem and roots; The transpiration pull maintains continuous column of water from the roots to the leaves. (20 marks)