

CLASS: FORM 2

SUBJECT: BIOLOGY

TOPIC 1: TRANSPORT IN PLANTS AND ANIMALS.

1. Define transport.

-Movement of substances from one part of the body to another.

2. State three ways in which transport in plants and animals is important.

-Make nutrients move from one point to another.

-Movement of respiratory gases i.e. oxygen and carbon IV oxide.

-Elimination of metabolic wastes.

-Movement of hormones.

-Movement of water.

-Movement of salts.

-Movement of enzymes.

3. Describe the structure and function of root hair.

-Root hairs are found near the root tip

-They are cells with elongated finger-like projections which are in contact with soil particles

-They are permeable to water and mineral salts hence are used to absorb Water and mineral salts

-Their large number offers a large surface area for absorption of water and mineral salts.

4. State ways in which the root hairs are adapted to their functions.

-The root hair is long/narrow/numerous to increase surface area for absorption of water and mineral salts.

-Many mitochondria in cytoplasm to supply energy for active transport of mineral salts.

-Are thin walled to speed up rate of absorption of Water and mineral salts.

5. State the similarities and differences between a dicotyledonous and monocotyledonous root.

Similarities

- Both used for anchorage and absorption of water and mineral salts -Both have root hairs, epidermis, pericycle, cortex, endodermis and vascular bundles (xylem and phloem)**
- Both may be used to store food/storage organs**

Differences

Monocotyledonous

- Phloem and xylem are arranged in ring form alternately -Pith present**

Dicotyledonous

- Phloem lies between radial rays of central xylem (star shaped) -Pith absent**

6. Name the transport structures of a flowering plant.

- Xylem vessels and tracheids transport water and mineral salts from the soil. -Phloem vessels translocate manufactured food from leaves to other parts of the body.**

7. State the ways in which xylem vessels are adapted to their function.

- Lignified/thickened to prevent collapsing. -Narrow to facilitate capillary.**
- No cross walls for continuous flow/column of water. -Have bordered pits for lateral movement of water.**

8. Why do flowering plants need water? **-Photosynthesis.**

- Transport.**
- Turgidity w h helps in plant support.**
- Solvent i.e. medium for chemical reactions.**
- Cooling effect during transpiration.**
- Seed germination.**

9. Describe the movement of water from the soil to the leaves of a tall plant.

- Soil water exists as a thin film in the soil, between soil particles -The concentration of cell sap of root hair is greater than that of the surrounding solution in the soil, thus drawing the Water molecules across the cell wall and cell membrane into the root hair by osmosis
- Water drawn into the root hair cell dilutes the cell sap making it less concentrated than that in the adjacent cortex cells of the root
- Due to osmotic gradient water moves from the root hair cells into the cortex by osmosis, from cell to cell by osmosis, across the endodermis by active transport into xylem vessels of the root that conduct water into xylem vessels of the stem into xylem vessels of the leaves

Stem

- Once in the stem water moves up the plant aided by the narrowness of the xylem vessels (capillary), root pressure, attraction of water molecules to each other (cohesion).
- Attraction of water molecules to the Walls (adhesion) from the stem water enters the xylem of leaves
- Water moves in the xylem vessels of the stem in a continuous (uninterrupted) water column up to the tree leaves

Leaves

- Once in the leaves water moves into the mesophyll cells by osmosis as water vaporizes from the spongy mesophyll cells their sap becomes more concentrated than the adjacent cells as the result water flows into the cell from other surrounding cells which in turn takes in water from xylem vessels within the leaf veins this creates a pull (suction force) called transpiration pull that pulls a stream of water from xylem vessels in the stem and roots.
- The transpiration pull maintains a continuous column of water from the roots to the leaves.

7. Name the process by which mineral salts enter into a plant.

- Active transport.
- Diffusion.

8. Explain the forces that make water and mineral salts move through a plant. -Mineral salts are taken up due to diffusion because of the concentration gradient between the mineral ions in sap and those in soil solution -Active transport involves energy in form of ATP due to respiration which forces mineral salts through a plant against a concentration gradient -Water moves by osmosis through a semi-permeable membrane of root hairs and between cells of stem

- In the stem water moves by cohesion (attraction of water molecules to each other)**
- It also moves by adhesion (attraction of water molecules to walls)**
- Capillarity is due to narrowness of xylem vessels**
- Transpiration pull occurs When Water vapor evaporates from sub-stomatal chambers into the air**
- Root pressure is a force that pushes Water up the stem from the roots and causes guttation /exudation.**

9. Explain the uptake of mineral salts by plants.

- Plants require mineral salts for metabolism and proper functioning of their bodies.**
- Mineral salts are taken up from the soil into the root hairs in form of solution by active.**
- Transport which requires energy.**
- Active transport involves substances called carriers taken up together with water and are then carried to the stems and leaves.**
- The main process involved in uptake and movement of mineral salts is active transport.**

10. What is transpiration?

It is the process by which plants lose water go the atmosphere in form of water vapor.

11. Name the sites through which transpiration takes place in a plant.

- Stomata (stomatal transpiration)**
- Lenticels (lenticular transpiration)**
- Cuticle (cuticular transpiration)**

12. State the importance of transpiration to plants.

- Cooling the plant.**
- Transport of water.**
- Transport of mineral salts.**
- Excretion of excess Water from plants.**

13. What is the effect of excess transpiration in plants?

- It causes wilting.**

14. Explain the structural factors that affect the rate of transpiration in plants.

-Number of stomata i.e. the more the stomata the higher the rate and vice versa -Turgidity of the guard cells which control the opening and closing of stomata when they are open transpiration rate is high.

-Size of leaves where the larger the surface area the higher the rate of transpiration.

-Leaf fall leads to lower rate of transpiration and also drying of leaves reduces rate of transpiration.

-Thin cuticle reduces distance through which water vaporizes hence increase transpiration rate. Absence of cuticle also increase rate of transpiration.

15. Explain the environmental factors that affect rate of transpiration in plants.

-High temperature increases rate of transpiration and low temperature reduces the rate.

-Humidity when high increases rate and when low reduces the rate.

-Transpiration rate is higher in moving air (wind) than in still air. -High light intensity increases internal temperature hence higher rate of evaporation leading to higher rate of transpiration.

-Availability of water in the soil leads to more absorption hence more loss to the atmosphere.

-Atmospheric pressure when high leads to more evaporation and when low leads to low rate evaporation of water.

16. State the structural differences between xylem vessels and sieve tubes.

-Sieve tubes have cross wall while xylem vessels have none

-Xylem vessels are lignified while sieve tubes are not

-Sieve tubes have cytoplasm elements while xylem vessels have none.

17. State the adaptations of plants which enable them to reduce water loss.

-Thick waxy cuticle

-Reduced leaf size/thorns/spines

-Shedding of leaves

-Sunken stomata. Water vapor accumulates in the depression of stomata lowering the water vapor concentration gradient leading to lower rate of evaporation.

-Rolling of leaves.

18. State the factors that cause increase in the rate of transpiration from leaves.

-Increased light intensity.

- Low relative humidity.
- Temperature.

19. Explain how drooping of leaves on a hot sunny day is advantageous to a plant. **-Reduces surface area exposed to sun reducing cuticular transpiration.**

20. State the adaptations of xerophytes to their habitat. **-These are plants growing in dry areas. -Roots grow very deep to absorb water**

-Succulent/fleshy leaves to store water

-Few stomata which are sunken

-Thickened waxy cuticle

-Leaves are hairy and often folding

-Some leaves are needle-like/spines or scales

-Leaf surfaces are reduced i.e. small leaves

All these adaptations are to reduce water loss

21. State the adaptations of hydrophytes to their habitat.

-These are plants growing in water.

-Leaves are broad.

-Leaves have many stomata on upper side only (none on the lower surface).

-Some leaves float on water. -Absence or reduced leaf cuticle -Large air spaces.

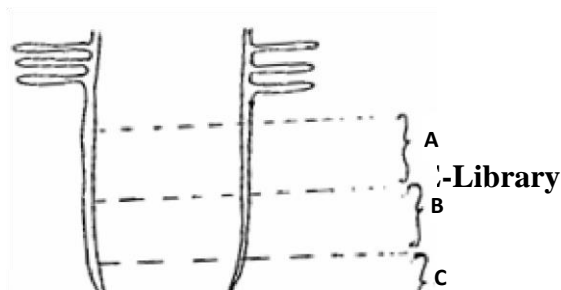
-Some leaves are submerged.

-Poorly developed or reduced vascular bundles.

All the above adaptations ensures minimum water intake and maximum water loss, since water is in excess.

22. What is translocation?

Transfer of manufactured food substances from the leaves to the parts of the plant where they are required.



23. The diagram **below** shows regions of growth in a root. Study it and answer the questions that follow.

a).Name the zone labeled **B**

Zone of cell elongation;

b).State the function of part **K**

-protect the delicate apical meristem;

c).State three characteristics of the cells found in zone **C**

-lack vacuoles;

-Have thin cell walls;

-Are small;

-Are actively dividing;

24. Explain each of the following:

a).A mature plant cell does not lose its shape even after losing water.

Presence of cellulose cell walls.

b).Xylem vessels do not collapse even when they are not conducting water.

Lignified to prevent collapsing;

25. Name the tissue which is responsible for translocation of manufactured food in flowering plants. **-Phloem tissue.**

26. State how the following structural features affect transpiration

i).Leaf fall

Reduces surface area for transpiration to occur.

ii).Sunken stomata

Water vapor accumulate in sunken pits reducing saturation deficit for transpiration to take place

iii).Thin cuticle.

Reduces distance for diffusion of water vapor from epidermal cells, increasing the rate of transpiration

27. State two differences in the roots of *Monocotyledonae* and *Dicotyledonae*?

Monocotyledonae	Dicotyledonae
Vascular bundles alternate	Xylem is star shaped surrounded by a phloem
Fibrous	Taproot
Has a pith	Lack a pith

28. Describe the process of absorption at the root hair to the xylem of the root.

The root hair cell sap is hypertonic to the soil water; water from the soil moves into the root hair cell sap by osmosis; this makes the cell sap hypotonic/dilute; compared to hypertonic adjacent cortex cells; water moves into the cortex cells by osmosis; till it reaches the casparian layer; which pumps water into the xylem of the root; this is called the root pressure;

29. Describe how temperature and light intensity affect the rate of transpiration.

Increase in temperature causes evaporation of water into the intercellular airspace of the leaf; this makes water vapor from adjacent cells to move into the stoma; creating diffusion gradient deficit between the atmosphere and intercellular space increased transpiration;

Increase in light intensity; increases rate of photosynthesis; leading to opening of stomata which leads to increased transpiration.

30. The number and distribution of stomata on three different leaves are shown in the table below.

Leaf	Number of stomata	
	Upper epidermis	Lower epidermis
A	300	0
B	150	200
C	2	13

(a).Suggest the possible habitat of the plant from which the leaves were obtained. **A**

- Aquatic / fresh water.

B – Forest.

C - Arid / semi - arid / desert.

(b).State **one** modification found in the stomata of leaf (C).

Sunken / hairy / reversed rhythm / small / stomatal pores.

31. Name the processes that bring about the translocation of manufactured food.

-Active transport. -Diffusion.

-Mass flow.

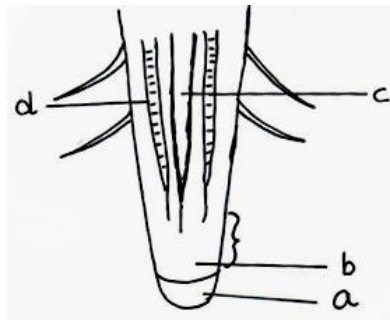
-Cytoplasmic streaming.

32. Distinguish between closed and open circulatory systems.

Closed system has blood vessels through which blood moves eg vertebrates while open system has no blood vessels hence blood is in direct contact with tissues e. g arthropoda.

33. Study the diagram below and answer the questions that follow.

(3 marks)



(i). Label parts: a, b and c

a -Root cap; b - Apical meristem;

c - Xylem;

(ii) State function of part labelled d.

Translocation;

34. State the adaptation that enable red blood cell to move in blood capillaries. **Flexible / able to change shapes;**

35. Name **two** forms in which carbon (IV) oxide is transported in blood.

- Carbominohaemoglobin;

- Weak carbonic acid;

- In blood plasma (in solution form);

36. What is tissue fluid?

Blood plasma that lacks blood cells and plasma proteins;

37. State **three** structural differences between arteries and veins.

Arteries

- **Thick muscular walls**
- **No valves**
- **Narrow lumen**

Veins

- **Thin muscular walls;**
- **Valves present;**
- **Wide lumen;**

38. Describe the mechanism of opening and closing of stomata using photosynthesis theory. **The guard cells have chloroplasts; in presence of light; photosynthesis occur in the guard cells of stomata; producing sugar in guard cells; This increases the osmotic pressure of guard cells; water is drawn from the neighboring cells by osmosis; causing turgidity of guard cells; the inner walls of the guard cells which are thicker than outer wall stretch more causing the guard cells to bulge outwards; stomata open.**

In absence of light, no photosynthesis in guard cells; sugar in guard cells is converted into starch; osmotic pressure lowers; guard cell lose water to adjacent epidermal cells by osmosis; become flaccid; the inner walls of guard cells shrink; the thicker wall reduces; this closes this stomata.

39. Explain why guards cells have thicker inner walls and thinner outer walls.

- Guard cells regulate the opening and closing of stomata, when they are turgid they bulge out and the thicker inner walls have a gap between them therefore opening the stomata;

40. Explain why

i).Blood group O is a universal donor.

Lacks antigens to react with the recipient's antibodies (to cause agglutination) ii).Blood group AB is a universal recipient.

Has no antibodies to react with the donor's antigen (causing agglutination)

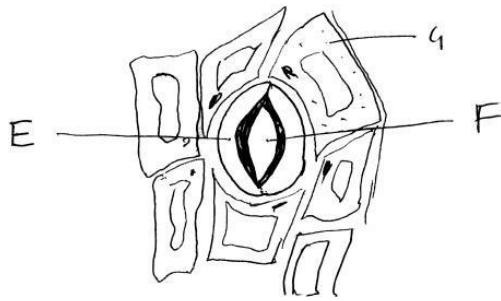
41. Name the blood vessel that links arterioles to venules

Capillary.

42. What is the adaptive advantage of arteries having a narrower lumen?

To create/sustain higher blood pressure which moves the blood to all body parts from the heart.

43. The diagram below represents epidermis of a leaf



a). Name the parts marked E, F and G

E – Guard cell;

F – Stomatal opening/stoma;

G – Epidermal cell;

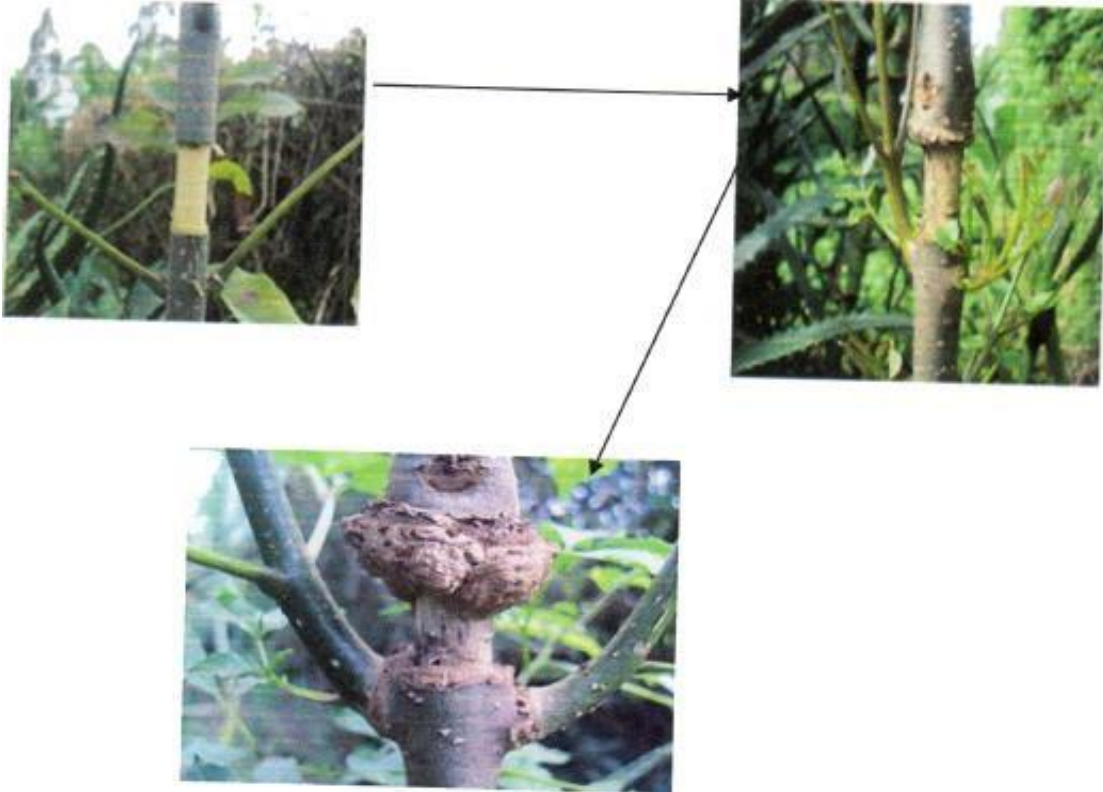
b) .State **two** aspects of cell E that are an adaptation to its function.

Thick inelastic inner wall; thin elastic outer wall.

c) .Describe the changes that would take place in E if the cells were placed in concentrated sugar solution for a long period.

Water would leave vacuole and cytoplasm by osmosis; They shrunk the cytoplasm draws away from the cell wall; the guard cell becomes plasmolysed;

44. Use the photograph of plant experiment to answer the questions that follow.



i).Name the process being investigated.

Translocation

ii) Name the plant tissue involved in the physiological process illustrated above.

Phloem tissue

iii) Name the physiological process involved in the process illustrated above.

Active transport/mass flow through diffusion. iv).How
is the plant tissue named in (ii) above adapted to its function.

- Have sieve plates that support the phloem tissue.
- Have sieve pores that acts as a pathway to allow movement of materials.
- Sieve tubes are cylindrical and joined end to end interconnected by cytoplasmic filaments.
 - Sieve elements lack other cell components like nuclears.
- Has companion cells that have numerous mitochondria to supply energy needed for active transport.
- Presence of plasmodesmata between sieve elements and companion cells to facilitate movement of materials

45. Name the material that strengthen xylem tissue.

Lignin

46. Name the tissue that is removed when the bark of the dicotyledonous plant is ringed.

Phloem

47. Name **three** meristems in woody plants.

- Apical meristems;**
- Lateral buds;**
- Vascular cambium;**
- Cork cambium;**

48. Name the tissue that transports the sugars made by photosynthesis to other parts of the plant.

-Phloem

49. Explain the effect of light on the opening of the stomata.

Light causes stomata to open ; in presence of light, photosynthesis occurs producing glucose which raises osmotic pressure of guard cells ; guard cell draw in water by osmosis from surrounding epidermal cells ; swell and eventually bulge causing stomata to open.

50. Explain how terrestrial plants are adapted to deal with problems of transpiration.

-Leaves are modified to spines or thorns, to reduce surface area over which transpiration occurs ;

- **Some shed their leaves during dry season; to reduce surface area exposed for transpiration.**
- **Some have thick, waxy cuticle; to minimize rate cuticular transpirations.**
- **Some can roll (fold) their leaves; to reduce the rate of transpiration by exposing fewer stomata to environmental factors; and reduce the leaf surface area exposed to transpiration.**
- **Have sunken stomata ; which accumulate moisture in sub stomatal air spaces hence low diffusion gradient thus reducing transpiration rate; Some have reduced number of stomata ; hence low transpiration rate ; Since the surface for water loss is reduced ;**
- **Some have reversed stomatal rhythm (opening stomata at night and closing them by day); to prevent excessive water loss by transpiration;**
- **Possession of very deep roots; to absorb water from deep in the soil e.g. Acacia.**
- **Others have superficial roots which grow horizontally close to soil surface; to absorb water after a short / light shower of rain.**

-Possession of parenchyma cells in swollen stems and leaves; for storage of water of cactus with swollen stem.

52. The table represents certain aspects of the circulatory system in certain animals. Fill in the missing spaces.

Heart	No. of atrium	No. of ventricles	Type of circulation
A	2	2	
B	2	1	
C	1	1	

A - Double circulatory system;

B - Double circulatory system;

C - Single circulatory system;

53. The red blood cells lack mitochondria.

a) How is this advantages to red blood cells?

To prevent them from consuming the oxygen they carry;

b) Apart from the reason stated above, give one other reason. **To create room for haemoglobin packaging;**

c) State two other characteristics of the red blood cell.

- Have thin membrane to reduce distance covered by diffusing gases;
- Have haemoglobin which has high affinity for oxygen;
- Are flexible / can bend and twist to be able to pass through the capillarity lumen.

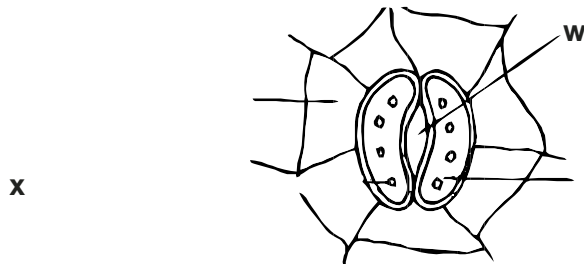
54. Name the three processes that takes place in the liver to bring about difference in composition of blood in hepatic portal vein and hepatic vein.

- Deamination;**
- Detoxification;**
- Blood sugar regulation;**

55. Explain why the rate of transpiration is reduced when humidity is high.

Air around the leaf gets saturated with water vapour hence less space for water vapour from the leaf to occupy/low saturation deficit / low diffusion gradient / the difference in concentration of water vapour in the atmosphere and in the air spaces is greatly /highly reduced.

56. The diagram below shows part of the plant tissue.



a).Name the cell labelled X and part labelled W.

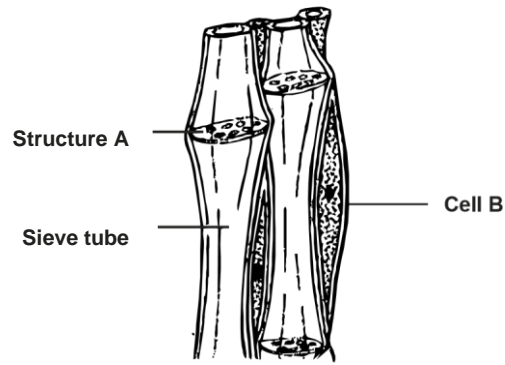
X - Guard cell;

W - Stoma

b) State two adaptations of cell labelled X to its function.

- **have chloroplast that help in the process of photosynthesis;**
- **have thin outer wall and thick inner wall to enhance bulging during opening of stoma.**

57. The diagram below represents phloem tissue from the stem of a plant.



a) i) Name the structure labelled A.

Sieve plate;

ii) State TWO substances transported in the phloem.

Sucrose; hormones; vitamins.

iii) Give the function of cell B.

Has mitochondria that provide energy for translocation;

58. State TWO features of the endodermis.

-Has casparian strip;

-Has starch grains

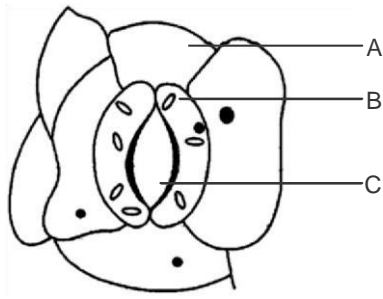
59. Explain the process by which water moves from the soil into the root hairs.

Root hair cell sap is hypertonic to surrounding soil solution; osmotic pressure of root hair cell sap overcomes the water holding / retention capacity of the soil; water is drawn from the soil solution into the root hair cell sap by osmosis; through cell wall and cell membrane;

60. What prevents blood in veins from flowing backwards?

Valves;

61. Study the diagram and answer the questions that follow.

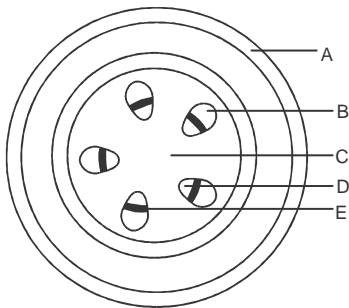


i).Name cells **A** and **B**

A- Epidermal cell;

B- Guard cell;

62. The diagram below represents a transverse section of a young stem.



a).Name the parts labelled **A** and **C** on the diagram.

A - Epidermis;

C - pith;

b).State the functions of the parts labelled **B**, **D** and **E**

B - Transports manufactured food / translocation;

D - Transports mineral salts and water;

E - Produces / gives rise to secondary thickening / growth / increase in the girth /give rise to additional xylem and phloem;

c).List **three** differences between the section shown above and one that would be obtained from the root of the same plant.

-Xylem at the centre star shaped;

-Phloem in arms of xylem;

-No pith (at the centre);

	Leaf surface	A	B
Number of stomata	Upper surface	25	5
	Lower surface	0	18

63. The table provided below shows stomata distribution on leaves

A and B and their surface area.

Surface area _____ 25 cm² _____ 18 cm²

- (a) Identify the habitats of the plant from which leaf A was obtained. **Fresh water / aquatic;**
- (b) Give a reason for your answer in (a) above.

**- Have maximum number of stomata on the upper surface ; -
Higher leaf surface area / broad leaf ;**

64. Distinguish between single and double circulatory system.

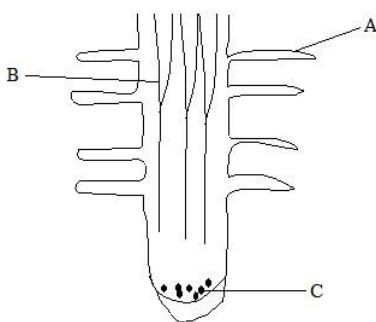
- Single circulatory system - blood flows through the heart only once during a complete circulation. ;**
- Double circulatory system blood flows through the heart twice for every complete circulation;**

65. Distinguish between blood plasma and serum.

Blood plasma; It is the fluid part of the blood, yellow in color and it consist of plasma proteins;

While a serum blood plasma from which plasma proteins have been removed;

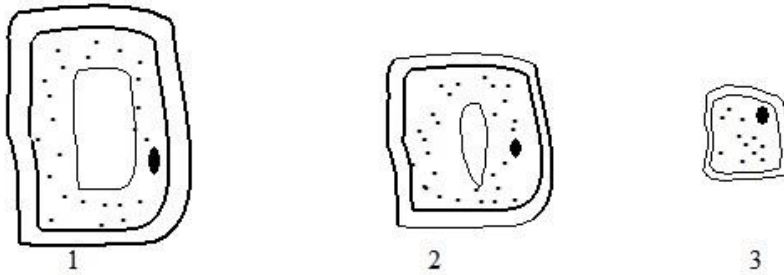
66. The following diagram is a longitudinal section of the root apex.



Identify the parts labeled A, B and C.

- A - Root hair;**
- B - Phloem;**
- C - Apical meristem;**

67. The figure below represents three cells 1, 2 and 3.



Identify the three regions of the root tip from which the cell were got from?

1 - Zone of cell differentiation;

2 - Zone of cell elongation;

3 - Zone of cell division;

68. What are the advantages of the closed circulatory system over open circulatory system?

- Closed system has continuous vessels hence able to generate high pressure.**
- Circulates blood over longer distance.**
- Circulates blood at a faster rate.**
- Efficient transport of nutrients and waste products.**
- Animals are more active.**

69. Describe the structure and function of the mammalian heart.

- The heart is a four-chambered hollow muscle located in the thoracic cavity -It consists of two small receiving chambers, the atria (auricles) and two larger pumping chambers, the ventricles**
- The left ventricle is the most powerful and has the thickest walls**
- This is because it is the chamber which pumps blood throughout the body**
- Each time it contracts, blood is forced out into the elastic arteries (aorta) -Blood moves on to the capillaries**
- From capillaries blood moves to veins and back to the heart through the vena cava**

- From vena cava it enters into right auricle which contracts and pumps blood into the right ventricle
- Right ventricle pumps blood into the lungs through the pulmonary artery -Blood releases carbon IV oxide to lungs and picks oxygen then returns to left auricle
- Left auricle pumps blood into left ventricle
- Left ventricle then pumps blood into the aorta and into arteries, starting the process all over again
- Both auricles contract simultaneously while both

70. Explain how the mammalian heart is adapted to performing its functions. **-The heart is made of muscles that contract and relax synchronously without requiring nervous stimulation**

- Nerve supply however, determine contraction strength and frequency
- The heart is divided into four chambers
- The right atrium is connected to the right auricle. It receives blood from the whole body.
- The blood is pumped from the left atrium to the right ventricle
- To avoid flow back into the right atrium, a valve is present between the two chambers the tricuspid valve
- The right ventricle pumps blood to the lungs
- This is facilitated by the presence of pulmonary artery
- A valve is also present to avoid blood flowing back from the pulmonary artery to the right ventricle
- Blood from the lungs enters the heart through the pulmonary vein into the left atrium.
- When the left atrium contracts, blood flows into the left ventricle -Blood will not flow back into the left atrium because of the presence of bicuspid valve (mitral)
- The left ventricle is connected with the aorta and when it contracts, blood flows into the aorta for distribution into the whole body
- The heart muscle surrounding the left ventricle is thicker than that surrounding the right ventricle to be able to generate enough pressure to push blood to the whole body
- A pace-maker is present in the heart muscle to initiate and synchronize contractions.
- For the heart muscle to be well nourished and be provided with enough oxygen and carbon IV oxide removal, it is supplied with blood by the coronary arteries and drained by the coronary veins

71. Explain why blood leaving the lungs may not be fully oxygenated.

- Under ventilation of the lungs
- Blockage of alveoli (air sacs)
- High cardiac frequency i.e. high rate of pumping of blood in the heart.

72. Give the reasons why pressure of blood is greater in the arterioles than in the veins of mammals.

- Blood is pumped to the arteries by the heart at high pressure**
- Blood pressure in veins is reduced by capillary resistance**
- Arteries have narrow lumen which maintains high pressure/veins have wide lumen which reduces pressure**
- Arteries have more/thicker muscular walls which generate pressure/veins have less/thinner muscular walls which reduce pressure**

73. Name the common heart diseases in humans.

- Thrombosis.**
- Atheroma.**
- Arteriosclerosis.**
- Varicose veins.**
- Cerebral vascular thrombosis.**

74. State the functions of mammalian blood.

- Transport of substances.**
- Defense against diseases. -Clotting.**
- Temperature regulation.**

75. State the structural differences between a red blood cell and a white blood cell.

Red blood cells

- Has hemoglobin**
- Smaller size**
- Lacks nucleus**

White blood cells

- Not pigmented**
- Larger size**
- Nucleated**

76. Explain how oxygen and carbon IV oxide are transported in the blood.

Oxygen

- Oxygen concentration is higher in lungs(alveoli) than in blood
- Oxygen in the alveoli dissolves in the film of moisture and diffuses through thin epithelial and capillary walls into plasma and red blood cells
- The oxygen combines with haemoglobin to form oxyhaemoglobin
- Blood then becomes oxygenated
- Blood from lungs then travels to all body tissues where the oxyhaemoglobin breaks down to form oxygen and haemoglobin
- Haemoglobin is transported back to the lungs to collect more oxygen while the oxygen in capillaries diffuses into body cells for respiration -Respiration produces carbon IV oxide

Carbon IV oxide

- Carbon IV oxide produced during respiration diffuses out of cells into blood plasma and red blood cells due to concentration gradient
- Carbon IV oxide and water form carbonic acid carbamino compounds with haemoglobin
- In the presence of carboxyl anhydrase enzyme, hydrogen carbonate is carried in blood to the lungs
- In the lungs the hydrogen carbonate dissociates to liberate carbon IV oxide which diffuses into alveolar cavity due to concentration gradient
- From alveolar space carbon IV oxide is expelled during expiration

Most carbon IV oxide is transported from tissues to lungs within the red blood cells and not in the blood plasma. Give the advantages of this mode of transport.

- pH of blood is not altered/homeostasis is maintained
- Within the red blood cell is an enzyme, carbonic anhydrase which helps in fast loading (combining) and offloading of carbon (IV) oxide.

77. What is blood clotting?

- Process in which blood components clump together to prevent loss of blood from an injured/cut vessel.

78. Name a protein, vitamin, an enzyme and a mineral element involved in blood clotting

- Protein — fibrinogen/prothrombin**
- Vitamin - k/quinine**
- Enzyme — thrombokinase/thromboplastic/thrombin -**
- Mineral element — calcium**

79. State the role of blood clotting on wounds.

- Prevents blood/body fluids from being lost**
- Conserves water and salts**
- Prevents entry of microorganisms/pathogens**
- Regulates body temperature**
- Enables wound to heal faster**

80. Explain why blood flowing in blood vessels does not normally clot.

- Presence of anticoagulant in blood.**

81. Explain the meaning of a universal donor.

- A person who can donate blood to any other blood group without agglutination/clumping**
- This is usually blood group O**
- However this person cannot receive blood from other blood groups except group O**

82. Explain the meaning of universal recipient

- Can receive blood from all blood groups without agglutination**
- This is usually blood group AB**

-However, can only donate blood to group AB

83. What is the difference between rhesus positive and Rhesus negative blood samples?

-Rhesus positive blood has the Rhesus (Rh) antigen -Rhesus negative lacks the Rhesus antigen

84. What is blood transfusion?

-Injection of blood from one person to another.

85. Under what conditions would blood transfusion be necessary in people?

-During accidents

-During surgery in hospitals

-Bleeding mothers when giving birth

86. How can low blood volume be brought back to normal?

-Transfusion.

-Taking fluids.

-Eating iron rich food/taking iron tablets.

87. How may excessive bleeding result in death?

Anaemia/low blood volume/loss of iron/low red blood cells count/low haemoglobin leading to low oxygen, loss of nutrients and dehydration.

88. State the precautions that must be taken before blood transfusion.

- Blood must be disease free.**
- Sterilized equipment must be used.**
- Blood of the recipient and that of the donor must be compatible to both ABO and rhesus factor.**
- Fresh blood must be used.**

89. What is immunity?

- Resistance to disease by organisms.**

90. Distinguish between natural and acquired immunity

- Natural immunity is inherited/transmitted from parent to offspring/inborn/innate**
- Acquired immunity is developed after suffering from a disease or through vaccination.**

91. What are allergic reactions?

- Excessive sensitivity and reaction of an individual to certain substances in environment e.g. dust, pollen, perfumes, smoke etc.**

92. How does an allergic reaction occur?

- The substances act as antigens**
- An antigen-antibody reaction occurs on surface of cells**
- The cells release a substance called histamine**
- The histamine causes irritation, itching and may stimulate nasal discharge**

93. State the role of vaccination against certain diseases.

- Protect body against infectious diseases**
- Prevent spread/transmission of certain diseases**
- Diseases for which vaccination is given include tuberculosis, poliomyelitis, measles,**

-Whooping cough, diphtheria