



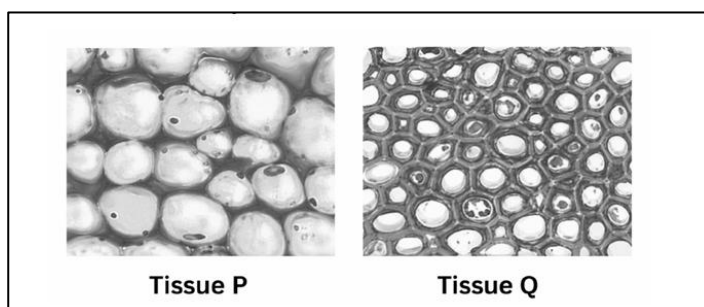
INDIAN SCHOOL AL WADI AL KABIR



Class: IX	DEPARTMENT OF SCIENCE:2026-27 SUBJECT: BIOLOGY	DATE : 24-08-2026
WORKSHEET NO: 3 WITH ANSWERS	TOPIC: TISSUES IN ACTION- PART 1	A4 FILE FORMAT (PORTFOLIO)
CLASS & SEC:	NAME OF THE STUDENT:	ROLL NO.

I. OBJECTIVE TYPE QUESTIONS (1 Mark):

- The stems of dicot plants undergo an increase in diameter or girth over time, leading to the formation of wood. Which specific tissue is responsible for this lateral expansion?
(A) Apical meristem
(B) Intercalary meristem
(C) Lateral meristem
(D) Primary permanent tissue
- The given micrographs display two types of supporting tissues found in plants. Which structural feature primarily differentiates Tissue P from Tissue Q?



- Tissue P has uniformly thickened walls, whereas Tissue Q has thin cell walls.
 - Tissue P has unevenly thickened corners due to pectin, whereas Tissue Q has thick lignified walls.
 - Tissue P contains large intercellular spaces, whereas Tissue Q is tightly packed.
 - Tissue P consists entirely of dead cells, whereas Tissue Q consists of living cells.
- A grass lawn is repeatedly mowed, yet the grass continues to grow rapidly from the bases of its leaves. Which type of meristematic tissue is responsible for this regrowth?
(A) Meristematic tissue at the growing tips
(B) Meristematic tissue responsible for increase in girth
(C) Meristematic tissue located at the nodes or bases of leaves
(D) Permanent tissue responsible for water conduction
 - A group of students observed the cross-section of a tree trunk and noticed several concentric rings. They learned that some rings were wider than others. The teacher explained that these annual growth rings are formed due to the activity of lateral meristem and can provide information about the tree's growth history. Which of the following conclusions can be correctly

drawn from the observation?

- (A) Wider growth rings indicate favourable growth conditions during that year.
 - (B) Narrower growth rings indicate that the tree grew faster during that year.
 - (C) The number of growth rings indicates the number of branches present on the tree.
 - (D) Growth rings are formed due to the activity of apical meristem and indicate the height of the tree.
5. As newly formed plant cells mature; they undergo a biological process in which they acquire a specific shape, size, and function. What is the correct term for this process?
- (A) Multiplication
 - (B) Differentiation
 - (C) Elongation
 - (D) Regeneration
6. The leaf stalks of coriander are remarkably flexible and can bend considerably without breaking easily. Which underlying supporting tissue primarily provides this vital mechanical flexibility?
- (A) Parenchyma
 - (B) Sclerenchyma
 - (C) Collenchyma
 - (D) Apical meristem
7. In multicellular organisms, there is a specific hierarchy of biological organization that ensures division of labour. Arrange the following levels in the correct developmental sequence from simplest to most complex.

1.Organ, 2. Tissue, 3. Cell, 4. Organism, 5. Organ system

- (A) 3, 2, 1, 5, 4
- (B) 2, 3, 1, 5, 4
- (C) 3, 1, 2, 4, 5
- (D) 3, 2, 5, 1, 4

For the questions 8 to 12, two statements are given-one labelled Assertion (A) and the other labelled Reason(R). Select the correct answer to these questions from the options(i), (ii), (iii) and (iv)as given below:

- i. Both A and R are true, and R is the correct explanation of the assertion.
- ii. Both A and R are true, but R is not the correct explanation of the assertion.
- iii. A is true but R is false.
- iv. A is false but R is true.

8. **Assertion (A):** The growth of plants occurs only in certain specific regions.

Reason (R): The meristematic tissue is found all over the plant body.

9. **Assertion (A):** The cells of meristematic tissues generally lack vacuoles.

Reason (R): Vacuoles are primarily responsible for storing sap and providing rigidity, which is not required by actively dividing cells.

10. **Assertion (A):** Plant tissues are made up of only dead tissues.

Reason (R): Dead tissues can provide mechanical strength and need less maintenance

11. **Assertion (A):** Epidermal cells aid in protection against loss of water and mechanical injury.

Reason (R): They secrete a waxy, water-resistant layer on their outer surface

12. **Assertion (A):** Water hyacinth can float on the water surface.

Reason (R): Aerenchyma tissue is present in water hyacinth.

II. SHORT ANSWER TYPE QUESTIONS (2 Marks):

13. (i) Why does a fresh twig bend while a dry twig breaks?

(ii) How do stomata indirectly help in water transport?

14. What are root hairs? State their primary function in plants.

15. Name the three tissue systems found in plants. Mention one main function of each tissue system.

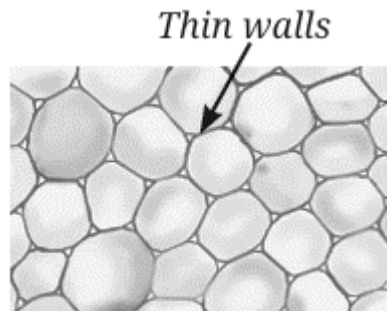
16. A student observed two plants growing in different environments. Plant A was growing in a moist area, while Plant B was growing in a very dry habitat. The student noticed that Plant B had a much thicker waxy covering on its epidermis.

(i) Name the waxy covering present on the epidermis.

(ii) Why would Plant B have a thicker layer of this covering?

(iii) How does this covering provide protection to the plant apart from reducing water loss?

17. (i) Identify the tissue shown in the diagram and mention one characteristic feature visible in it, other than its thin cell wall.



(ii) What are the two main functions performed by this tissue in plants?

III. SHORT ANSWER TYPE QUESTIONS (3 Marks):

18. With the help of a labelled diagram, show the location of apical meristem in a young sapling.

Explain how apical meristem helps in the growth of the plant.

19. Give the differences between the following

(i) Simple and complex tissues

(ii) Xylem and Phloem

20. List the constituents of phloem. What will happen if the phloem at the base of the branch is removed?

21. Write the important characteristics of meristematic tissues.

22. What are cork tissues? How are they formed?

23. Name the three types of meristematic tissue and state the region of the plant body where each is found.

24. Cells of epidermal tissue form a continuous layer without intercellular space. Why?

25. Name the different cellular components of xylem tissue. Which of these components is the only living component?

IV. LONG ANSWER TYPE QUESTIONS (5 Marks):

26. Make a table showing, the structure, location, and function of parenchyma, collenchyma and

sclerenchyma respectively.

27. Give reasons for the following:

- (i) Meristematic tissue cells have a prominent nucleus and dense cytoplasm, but generally lack vacuoles.
- (ii) Sclerenchyma tissue provides great mechanical strength to structures like coconut husk.
- (iii) Root hairs are found in large numbers on the epidermis of roots.
- (iv) Stems of aquatic plants can float easily on water.
- (v) Grass grows back again soon after it is mowed or grazed by animals.

28. (i) Name the outermost layer present in plants

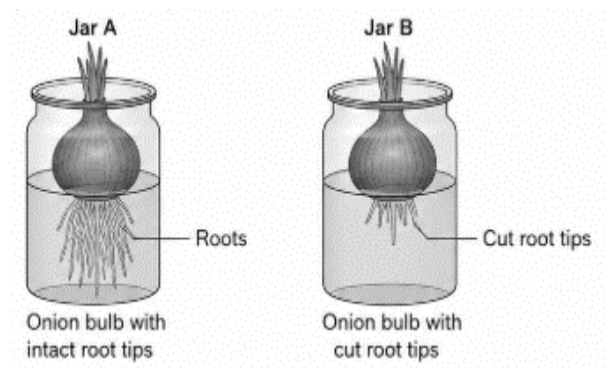
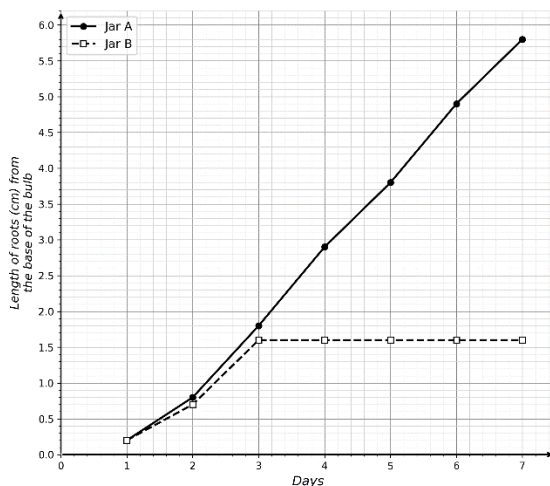
(ii) Give the characteristic features of this layer.

(iii) What are the different roles played by this layer?

29. Multicellular organisms show division of labour. Explain with the help of an example.

V.CASE STUDY-BASED QUESTIONS(4 Marks)

30. Observe the graph showing the growth of roots in two onion bulbs, A and B, over a period of 7 days. In bulb B, the root tip was removed during the experiment. Answer the following:



(i) Compare the growth of roots in Jar A and Jar B from Day 4 onwards.

(ii) What change in the experimental condition of Jar B could explain the difference in root growth shown in the graph?

(iii) Which meristematic tissue is responsible for the increase in length of the root?

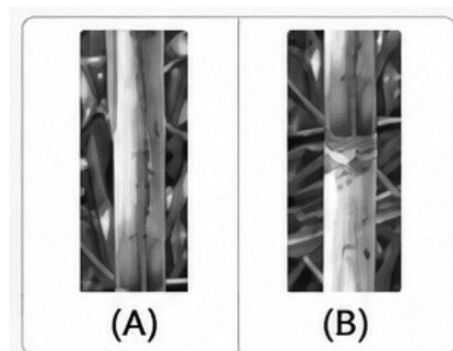
(iv) Based on the graph, what can you conclude about the importance of the root tip in the growth of a root?

31. In a forest, it was observed that one of the trees was severely debarked by an elephant to meet its food requirements, as the bark is a rich source of nutrients. Based on your learning, answer the following:



- (i) Which function(s) of the tree is/are hampered by debarking?
 - (ii) Which plant tissue would be affected by further damage to the tree trunk even after debarking?
 - (iii) Which function of the tree would be hampered if the tissues beneath the bark were severely damaged?
 - (iv) What assumptions are you making to answer the questions above? How would the answer change if your assumptions are also changed?
32. Sohan designed an experiment for the regeneration of sugarcane using cuttings. He used two types of cuttings, type 'A' and type 'B'. After a few weeks, type 'B' cuttings sprouted and developed into sugarcane plants, whereas type 'A' cuttings did not sprout.

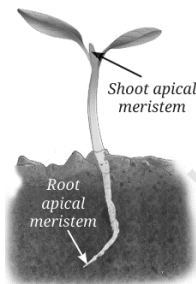
Answer the following questions:



- (i) Why were the type 'B' cuttings able to grow as sugarcane but type 'A' could not?
- (ii) What difference was present in type 'B' compared to type 'A'?
- (iii) What observation or measurement was made to determine whether this change had an effect?
- (iv) What parameters should be kept the same for both types of cuttings to ensure a fair comparison?

ANSWERS

I.OBJECTIVE TYPE QUESTIONS (1 MARK)	
1	(C) Lateral meristem
2	(B) Tissue P has unevenly thickened corners due to pectin (collenchyma), whereas Tissue Q has thick lignified walls (sclerenchyma).
3	(C) Meristematic tissue located at the nodes or bases of leaves (intercalary meristem)
4	(A) Wider growth rings indicate favourable growth conditions during that year.
5	(B) Differentiation
6	(C) Collenchyma
7	(A) 3, 2, 1, 5, 4 (Cell → Tissue → Organ → Organ system → Organism)
8	(iii) A is true, but R is false.
9	(i) Both A and R are true, and R is the correct explanation of A.
10	(iv) A is false, but R is true.
11	(i) Both A and R are true, and R is the correct explanation of A.
12	(i) Both A and R are true, and R is the correct explanation of A. (Specialised parenchyma forms air spaces in aquatic plants, helping them float.)
II. SHORT ANSWER TYPE QUESTIONS (2 MARKS)	
13	(i) A fresh twig bends because collenchyma provides flexibility. When the twig dries, it loses water and turgidity, resulting in loss of flexibility; hence, it breaks easily. (ii) Stomata help in transpiration (evaporation of water vapour), which creates a transpiration pull in the xylem, thus helping in the transportation of water.
14	Root hairs are hair-like projections that arise from epidermal cells of roots. Their primary function is to increase the surface area for absorption of water and minerals from the soil.
15	The three tissue systems are: Dermal tissue system: forms the outer covering of the plant, protects inner parts and reduces water loss. Ground tissue system: forms the main body of the plant between dermal and conducting tissues (includes parenchyma, collenchyma, sclerenchyma). Vascular tissue system: consists of conducting tissues — xylem and phloem — for transport.
16	(i) Cuticle (waxy layer of cutin) (ii) Plant B lives in a very dry habitat; a thicker cuticle reduces water loss during transpiration through stomata. (iii) The cuticle also provides protection against mechanical injury and

	invasion by parasites.
17	(i) The tissue is Parenchyma. Characteristic feature (other than thin walls): the cells are loosely packed with intercellular spaces. (ii) Two main functions: it mainly stores food, and also performs photosynthesis in the green parts of the plant.
III. SHORT ANSWER TYPE QUESTIONS (3 MARKS)	
18	In a young sapling, the shoot apical meristem is located at the tip of the shoot, and the root apical meristem is located at the tip of the root. These consist of actively dividing cells. The apical meristem helps the plant grow in length — increasing the height of the stem and depth of the roots.  <i>Fig. 3.3: Location of apical meristem in a sapling</i>
19	(i) Simple tissues are composed of only one type of cell (e.g., parenchyma, collenchyma, sclerenchyma). Complex tissues are composed of more than one type of cells working together (e.g., xylem, phloem). (ii) Xylem transports water and minerals from roots to other parts of the plant and also provides strength; it consists of tracheids, vessels, xylem parenchyma and xylem fibres, of which only xylem parenchyma is living. Phloem transports food from leaves to other parts of the plant and is mostly made up of living cells; it consists of sieve tubes, companion cells, phloem parenchyma and phloem fibres.
20	Constituents of phloem: sieve tubes, companion cells, phloem parenchyma and phloem fibres. Since phloem transports food from leaves to other parts of the plant, if the phloem at the base of a branch is removed, the transport of food to the parts below the removed region (such as roots) would be hampered.
21	Characteristics of meristematic tissue: cells are small, have thin cell walls, a large and prominent nucleus, and dense cytoplasm. Vacuoles are generally absent, and cells are tightly packed with little or no intercellular space. These features allow continuous and rapid cell division.
22	Cork tissues: As plants grow older, cells below the epidermis of the stem develop the ability to divide, act as lateral meristematic cells, and form the cork cambium. Division of cork cambium cells gives rise to cork cells. Cork cells are dead, compactly arranged, and contain a substance that makes them impermeable to water and gases. This forms

	the bark of the tree.
23	Apical meristem — located at the tips of roots and shoots. Lateral meristem — located along the circumference of the stem (arranged in a ring). Intercalary meristem — located at the base of internode or just above the node.
24	Epidermal cells form a continuous layer without intercellular space because the epidermis protects all parts of the plant; being tightly packed prevents water loss and entry of harmful microorganisms, and protects against mechanical injury.
25	Cellular components of xylem: tracheids, vessels, xylem parenchyma and xylem fibres. The only living component is xylem parenchyma.

IV. LONG ANSWER TYPE QUESTIONS (5 MARKS)

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Tissue	Structure	Location	Function
Parenchyma	Living cells with thin walls, loosely packed with intercellular spaces	Ground tissue system (Soft parts of the plant, stems and roots Leaves Fruits, Packing tissue between other tissues)	Mainly stores food; performs photosynthesis in green parts; forms air spaces in aquatic plants for floating
Collenchyma	Living cells with unevenly thickened corners due to pectin deposition	Ground tissue system (stems, tendrils)	Provides support and flexibility; allows bending without breaking
Sclerenchyma	Thick walls due to lignin deposition; hard and strong; most cells dead	Stems, leaf veins, hard coverings of seeds and nuts (coconut husk, walnut shell)	Provides mechanical strength; forms woody structure

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(i) Meristematic cells are mainly concerned with cell division. Their primary function is mitosis. They do not have any food or waste material to store so vacuoles are usually absent in the meristematic cells.

(ii) Sclerenchyma cells have thick, lignified walls that make them hard and strong, providing great mechanical strength to coconut husk.

(iii) Root hairs increase the surface area for absorption of water and minerals from the soil, hence found in large numbers.

(iv) Stems of aquatic plants contain specialised parenchyma (aerenchyma) that forms air spaces, helping them float.

(v) Grass has intercalary meristem at the nodes of its stem, containing

	actively dividing cells, which enables it to regrow after mowing or grazing.
28	(i) Epidermis (ii) It consists of a tightly packed, single layer of flat and rectangular cells, covered with a waxy layer of cutin called cuticle; in plants living in dry habitats, the cuticle may be thicker. (iii) It protects all parts of the plant from mechanical injury, water loss, harmful microorganisms and extreme environmental conditions; the cuticle reduces water loss during transpiration; hair-like projections (root hairs) increase surface area for absorption; stomata in the leaf epidermis allow gaseous exchange and transpiration, which creates transpiration pull and helps eliminate wastes.
29	Different tissues perform specific functions, dividing labour among cells, which increases the efficiency of the body. For example, in animals, muscle tissue enables movement while nervous tissue carries messages to different parts of the body. In plants, xylem transports water and minerals while phloem transports food — each tissue specialising in a distinct function rather than a single cell type performing all functions (as happens in unicellular organisms like amoeba).
V.CASE STUDY BASED QUESTIONS (4 MARKS)	
30	(i) From Day 4 onwards, the roots in Jar A continue to grow, whereas the roots in Jar B show no further increase in length and remain constant. (ii) The root tip of the onion bulb in Jar B was cut on Day 3 — shown by the growth stopping after that point. (iii) The apical meristem present at the root tip is responsible for the growth of the root in length. (iv) The experiment shows that the root tip (which contains the apical meristem) is responsible for growth of the root in length; when the root tip is removed, further growth in length stops.
31	(i) Debarking removes the tissues in the bark including phloem, so the function of transport of food from leaves to other parts of the tree would be hampered. (ii) Further damage to the trunk (beneath the bark) would affect the xylem tissue. (iii) If the tissues beneath the bark (xylem) are severely damaged, the function of transport of water and minerals from roots to other parts of the plant would be hampered. (iv) Assumption: that debarking removes only the outer bark/phloem region without damaging the xylem underneath. If this assumption changes — that is, if the damage extends deeper to affect the xylem — then water and mineral transport would also be hampered, which could threaten the survival of the tree.
32	(i) Type B cuttings had a node containing intercalary meristem, which

	has actively dividing cells that allow sprouting. Type A cuttings lacked a node and hence could not sprout. (ii) Type 'B' had a node present, while type 'A' did not have a node. (iii) Observation: The sprouting of new shoots. Type B showed visible shoot development, while type A showed no growth or signs of regeneration. (iv) Parameters kept same: size/length of cuttings, type of soil, amount of water given, sunlight, temperature, and duration of the experiment.
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