

1 Meristematic tissues divide repeatedly. What property of their cells allows them to do this?

- (i) They have thick walls for protection.
- (ii) They contain large vacuoles that store nutrients.
- (iii) They have thin walls, dense cytoplasm and large prominent nucleus.
- (iv) They are functionally differentiated cells.

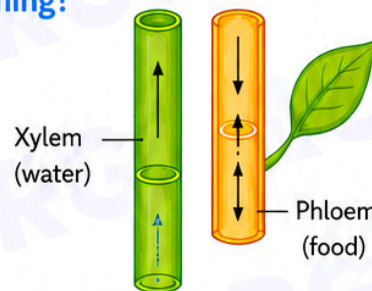
Answer: (iii) They have thin walls, dense cytoplasm and large prominent nucleus.



2 If a plant is unable to transport food from leaves to roots which tissue is malfunctioning?

- (i) Xylem
- (ii) Phloem
- (iii) Epidermis
- (iv) Sclerenchyma

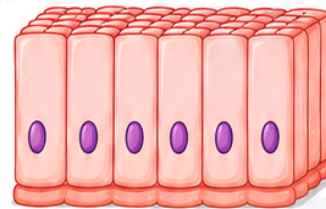
Answer: (ii) Phloem



3 Why are the epithelial tissues that line an animal's internal organs usually only one or a few cells thick?

- (i) To store food efficiently.
- (ii) To provide maximum strength.
- (iii) To allow quick exchange of materials across them.
- (iv) To reduce friction.

Answer: (iii) To allow quick exchange of materials across them.

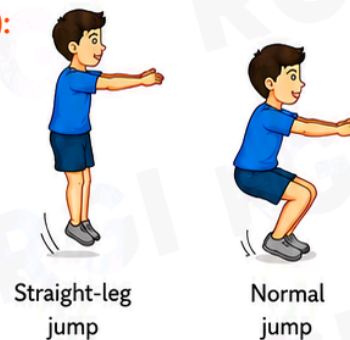


4 You can perform these two jumps (Fig. 3.21):

Straight-leg jump — keep knees and ankles stiff.
Normal jump — bend knees and ankles naturally.

How did your ankle, knee and hip positions differ between the two jumps?

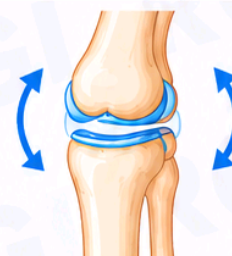
Answer: In the straight-leg jump, the ankles, knees and hips remain straight (no bending). In the normal jump, the ankles, knees and hips are bent.



5 Which type of joint is involved when you bend your knees and ankles?

- (i) Ball and socket
- (ii) Hinge
- (iii) Pivot

Answer: (ii) Hinge



6

In each of the following cases (A, B, C and D), choose the correct option as given below:



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

A

Assertion: Epithelium is well-suited for gas exchange in the lungs.

Reason: It consists of multiple layers of tall cells that slow down diffusion.

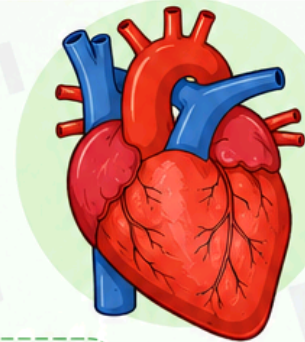


Answer: (iii) (A) is true, but (R) is false.

B

Assertion: Cardiac muscle can contract continuously without fatigue.

Reason: Cardiac muscle cells have a high number of mitochondria and an abundant blood supply.

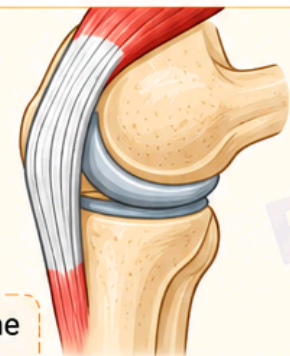


Answer: (i) Both (A) and (R) are true, and (R) is the correct explanation of (A).

C

Assertion: Tendons connect bone to bone and allow joint movement.

Reason: Tendons are made of tough connective tissue that transmits force from muscle to bone.



Answer: (i) Both (A) and (R) are true, and (R) is the correct explanation of (A).

D

Assertion: In a hinge joint, movement occurs primarily in one plane.

Reason: The bone ends are shaped to allow sliding in all directions.



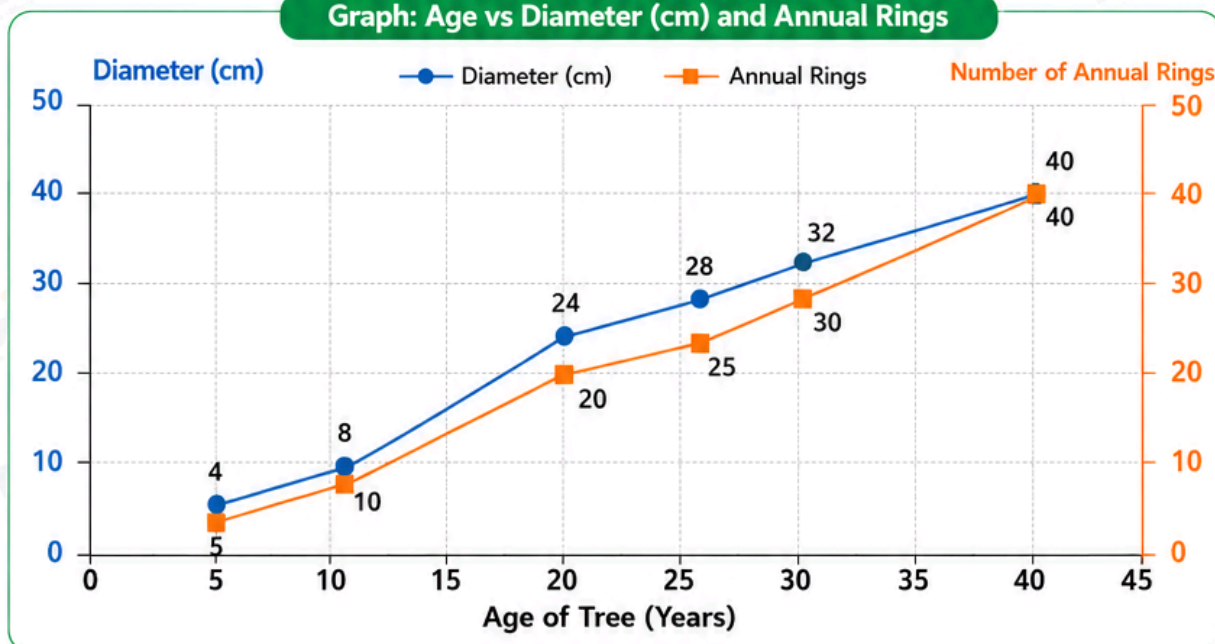
Answer: (iii) (A) is true, but (R) is false.

Plot a graph between the age of a tree (in years) on the x-axis and the diameter of the tree (in cm) along with the number of annual rings formed over time on the y-axis, using the data given in the Table 3.7.

Table 3.7: Data related to the age of a teak tree, and corresponding increase in the diameter of stem and number of annual rings

S. No.	Age of the teak tree (Years)	DBH (Diameter at Breast Height) of tree (cm)	Number of annual rings formed
1.	5	4	5
2.	10	8	10
3.	20	24	20
4.	25	28	25
5.	30	32	30
6.	40	40	40

Graph: Age vs Diameter (cm) and Annual Rings



(i) Analyse the graph in terms of the diameter of the stem over time and share the interpretation.

The graph shows that as the age of the teak tree increases, the diameter of the stem also increases steadily. The diameter increases slowly in the early years and more rapidly between 10 to 25 years. After 25 years, the rate of increase becomes slower, indicating that the tree growth starts stabilizing as it matures.

(ii) What is the relation between the diameter of the teak tree to the annual rings formed?

The diameter of the teak tree is directly related to the number of annual rings formed. As the number of rings increases with age, the diameter of the stem also increases. Both show a positive correlation, meaning more rings are associated with a larger diameter.

(iii) Which specialised tissue is responsible for the girth of the stem and where is it located?

The vascular cambium is the specialised tissue responsible for the girth (increase in diameter) of the stem. It is located between the xylem (inside) and phloem (outside) in the vascular bundles.

8.

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 (Fig. 3.22). Based on your learning, answer the following:



Fig. 3.22

(i)



Which function(s) of the tree is/are hampered by debarking?

Debarking hampers the transport of food (photosynthates) through phloem. It may also affect storage of food and wound healing.

(ii)



Which plant tissue would be affected by further damage to the tree trunk even after debarking?

- The vascular cambium and xylem would be affected by further damage.

(iii)



Which function of the tree would be hampered if the tissues beneath the bark were severely damaged?

- Transport of water and minerals (via xylem), transport of food (via phloem), support, and overall growth would be hampered.

(iv)



What assumptions are you making to answer the questions above? How would the answer change if your assumptions are also changed?

Assumptions:

- (1) The debarking is partial and not completely girdling the tree.
- (2) The tree is otherwise healthy.
- If the assumptions change, e.g., if the tree is completely debarked (girdled) or already diseased, it may die due to severe interruption in transport and lack of healing.

9. Aamrapali observed that a young mango sapling's stem bends flexibly during monsoon winds and does not break.

Which tissue is responsible for this flexibility? Predict and provide your explanation of the impact if the existing tissue was replaced by sclerenchyma.



✓ **Answer:** The tissue responsible for the flexibility of the mango sapling's stem is **collenchyma**.

Explanation: Collenchyma cells are living, elongated and have unevenly thickened cell walls. These thickenings provide mechanical support with flexibility, allowing the stem to bend during winds without breaking.

Impact if replaced by sclerenchyma: Sclerenchyma cells have very thick, lignified walls and are rigid and non-living. If collenchyma were replaced by sclerenchyma, the stem would become hard and brittle, and would likely break during strong winds.



10. Sohan designed an experiment for the regeneration of sugarcane, where he used cuttings to grow sugarcane. He used two types of cuttings, type 'A' and type 'B' (Fig. 3.23). After a few weeks, type 'B' cuttings sprouted and developed into sugarcane plants, whereas the type 'A' cuttings did not sprout.

(i) Why were the type 'B' cuttings able to grow as sugarcane but type 'A' could not?

→ Type 'B' cuttings had nodes with buds, which can develop into new shoots and roots. Type 'A' cuttings lacked nodes/buds, so they could not sprout.

(ii) What difference was present in type 'B' compared to type 'A'?

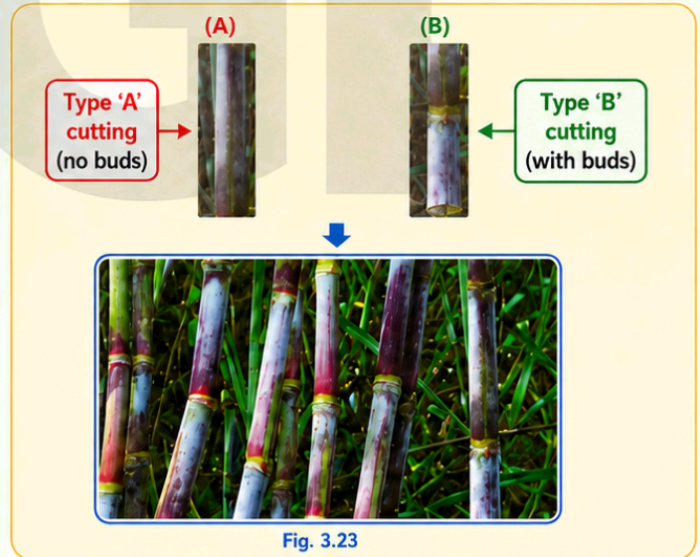
→ Type 'B' cuttings had nodes (with buds), whereas type 'A' cuttings did not have nodes or buds.

(iii) What observation or measurement was made to determine whether this change had an effect?

→ The observation made was the sprouting of buds and development of new shoots/roots into sugarcane plants after a few weeks.

(iv) What parameters should be kept the same for both types of cuttings to ensure a fair comparison?

Parameters to keep the same: same variety of sugarcane, similar size and age of cuttings, same number of nodes (except presence/absence of buds), same soil, same water, same light, same temperature, and same pot size.



11.

During the discussion in class, Rohan gives a statement that, "A tissue is a group of similar cells performing similar functions". But Rajiv counter argues that, "this is true in case of simple tissues but little different in case of complex tissues". Provide your explanation in view of the discussion in class.

Answer:

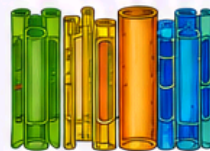
Rohan's statement is generally true for simple tissues, where cells are similar in structure and perform the same function. However, Rajiv is correct for complex tissues (such as xylem and phloem), the cells are different in structure but work together to perform a common function. Thus, the definition is applicable to simple tissues but a little different in case of complex tissues.

Simple tissue
(similar cells)



e.g., Parenchyma

Complex tissue
(different cells)



e.g., Xylem, Phloem

12.

Coconut husk fibres are used for mats which are tough and fibrous. Which tissue has structural features suitable for providing this strength? Explain why living parenchyma couldn't serve the same purpose.

Answer:

The tissue is sclerenchyma. Sclerenchyma cells have thick, lignified cell walls and are dead at maturity. These features provide rigidity, toughness and high tensile strength, making them suitable for fibres. Parenchyma cells are living, have thin cell walls and are meant for storage or photosynthesis, so they cannot provide the same strength.

Sclerenchyma fibre
(thick, lignified walls, dead, very strong)



Parenchyma cell
(thin wall, living, not strong)



13.

Vibha claims to her friend Neha that, "Meristematic cells are located only at the root and shoot apices". What do you think about this statement? What question can Neha ask Vibha to help her understand further if the statement is incorrect?

Answer:

The statement is incorrect. Meristematic tissues are not only at root and shoot apices but are also present in other regions such as intercalary meristems (at nodes/leaf bases) and lateral meristems (cambium) which increase girth.

Neha can ask: "Are meristematic tissues present anywhere else in the plant apart from the apical regions? If yes, where?"

Meristematic tissues occur at:

Apical meristem
(root tip)



Intercalary meristem
(node/leaf base)



Lateral meristem
(cambium)



14.

A plant cell and an animal cell are of the same size.

- Which cell will have a larger vacuole? Give reasons.
- What assumptions are you making to answer the question above?

Answer:

- Plant cell will have a larger vacuole.
Reason: Plant cells usually have a large central vacuole that occupies most of the cell volume, whereas animal cells have small or no vacuoles.
- Assumptions:**
 - Both cells are mature and fully developed.
 - Both cells are of the same type and function.
 - Both cells are measured in the same state (same turgidity/hydration).

Plant cell (large central vacuole)



Animal cell (small/no vacuole)



15.

A textbook states, "Each plant tissue performs only one specific function". What questions would you ask to critically examine the correctness of this statement? What examples of tissues would you take to find out the answers to these questions?

Answer:

Questions to examine the statement:

- Are there plant tissues that perform more than one function?
- Does the same tissue show different functions in different parts or stages of the plant? **find answers:**

Parenchyma (storage, photosynthesis, secretion), Collenchyma (mechanical support, flexibility).

Tissues with more than one function

Parenchyma



- Storage
- Photosynthesis
- Secretion
- Healing

Collenchyma



- Mechanical support
- Flexibility
- Protection