

Seed Plant Structure

1. List the three principal organs of seed plants, and state the function of each one.

2. What adaptation helps leaves conserve water?

Plant Tissue Systems

For Questions 3–6, complete each statement by writing the correct word or words.

3. The three main tissue systems of plants are _____ tissue, _____ tissue, and _____ tissue.
4. The cuticle protects against _____ loss.
5. Some epidermal cells have tiny projections known as _____, which may give a leaf a fuzzy appearance.
6. Dermal tissue in roots contains _____ cells that help absorb water.

For Questions 7–11, match the vascular-tissue elements with their descriptions.

Vascular-Tissue Elements

- _____ 7. Tracheids
- _____ 8. Lignin
- _____ 9. Vessel elements
- _____ 10. Sieve tube elements
- _____ 11. Companion cells

Description

- A. The main phloem cells
- B. Long, narrow xylem cells with openings in their cell walls
- C. Cells that support the phloem cells and aid in the movement of substances
- D. Xylem cells arranged end to end on top of one another
- E. The substance in the cell walls of dead tracheids that makes wood tough

12. How can water move from one tracheid into a neighboring cell?

13. How can materials move from one sieve tube element into the next?

14. Complete the table that compares ground-tissue cells.

Ground-Tissue Cells		
Type of Cell	Structure	Function
		Photosynthesis in leaves
	Cells with strong, flexible cell walls	
	Cells with extremely thick, rigid cell walls	

Plant Growth and Meristems

For Questions 15–19, write *True* if the statement is true. If the statement is false, change the underlined word or words to make the statement true.

- _____ 15. Meristems are regions of the plant that produce new cells by mitosis.
- _____ 16. Apical meristems are found in the growing tip of a root or stem.
- _____ 17. The specialized cells that result from cell division in meristems have thin cell walls.
- _____ 18. Newly produced plant cells undergo fertilization as they mature into different cell types.
- _____ 19. An apical meristem changes into a floral meristem when its pattern of gene expression changes.

Apply the Big idea

20. Plants are the source of many useful fibers, such as cotton and linen. Fibers are long, thin structures that have strength and flexibility. Which plant tissue system produces fibers such as cotton and linen? Justify your answer.

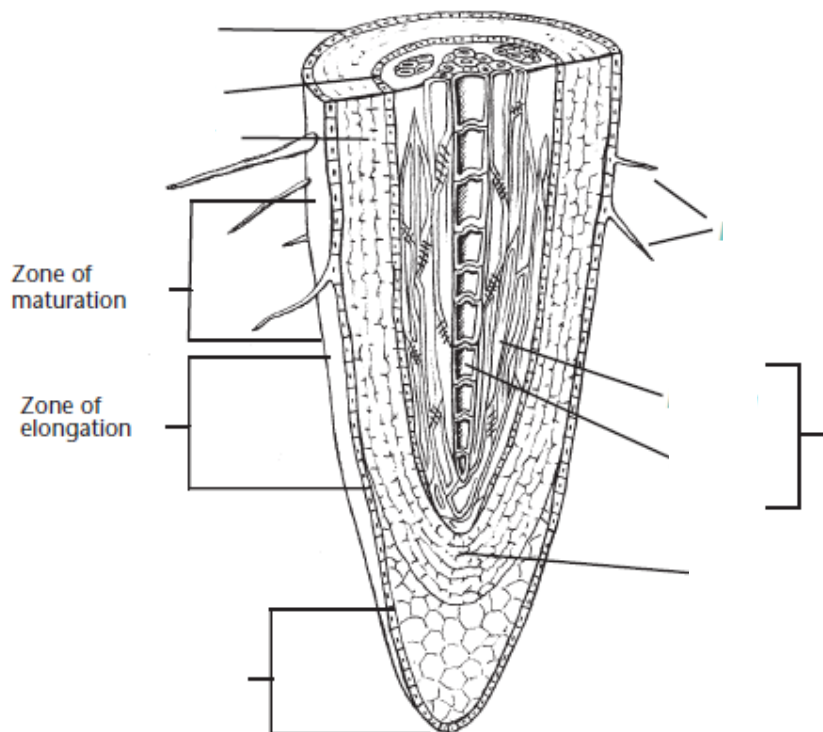
Root Structure and Growth

1. Complete the table that compares the types of root systems.

Types of Root Systems			
Type of Root	Description	Mainly in Dicots or Monocots?	Examples
	Long and thick primary roots that grow deep into the soil		
	Equally sized branch roots that grow separately from the base of the stem		

For Questions 2–6, complete each statement by writing the correct word or words.

- A mature root has a large area of _____ tissue between its dermal and vascular tissues.
- A root's surface area for absorption of water is increased by _____.
- One function of the _____ is the storage of starch.
- The _____ cylinder, made up of xylem and phloem, is found at the center of a root.
- A root's apical meristem can be found just behind the _____.
- THINK VISUALLY** Complete the illustration of a cross section of a root by adding labels for the parts indicated.



Root Functions

8. Name at least two functions, besides uptake of water and nutrients, of a plant's roots.

9. What is the role of active transport in the uptake of water by plant roots?

10. Where in roots are active transport proteins located?

11. What happens to water and dissolved minerals after they move across the epidermis of a root?

12. Why is there a one-way passage of materials into the vascular cylinder in plant roots?

13. How do water and nutrients cross the endodermis that surrounds the vascular cylinder?

14. What is root pressure?

Apply the Big idea

15. People often give potted houseplants more fertilizer than they need. As a result, the plants begin to wilt and eventually die instead of getting larger and healthier. What could be the reason for this result?

Stem Structure and Function

1. What are the three main functions of stems?

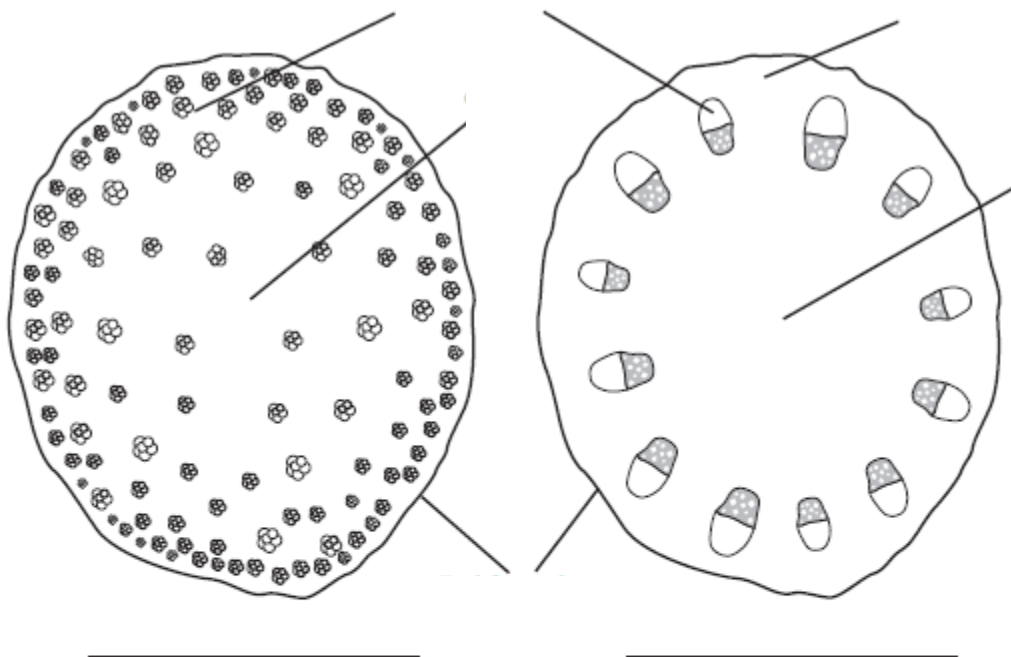
2. What is an example of a stem that conducts photosynthesis and stores water?

3. What is a node?

4. What kind of plant tissue does a bud contain?

5. What does a vascular bundle contain?

6. Complete the cross-section diagrams by writing labels for the structures indicated.



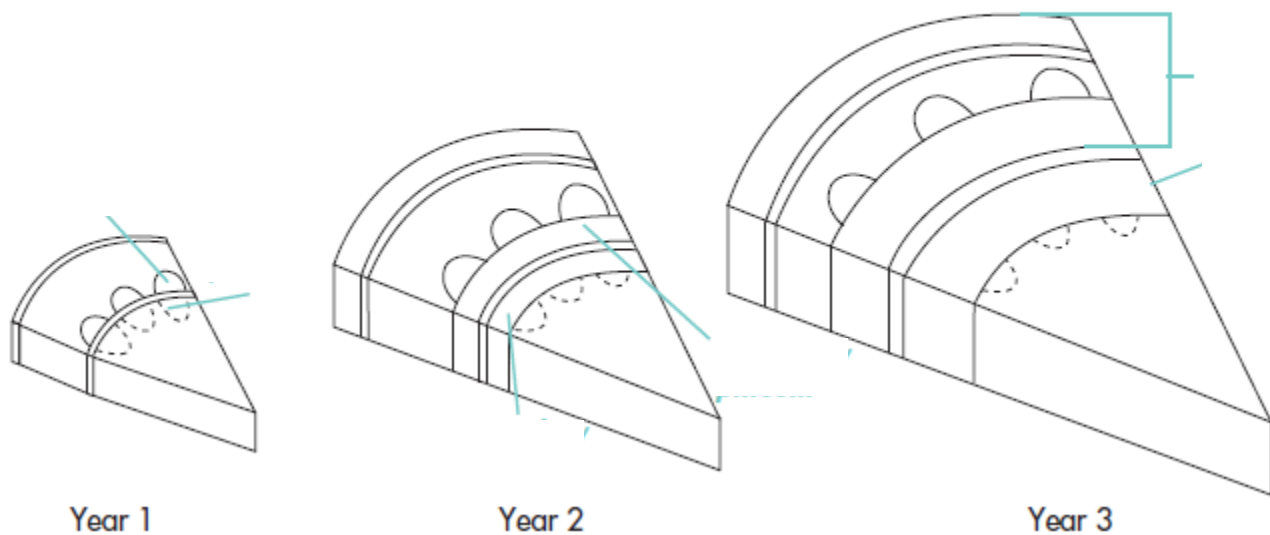
7. Complete the compare and contrast chart.

Structure of Monocot Stems and Dicot Stems	
Similarities	Differences

Growth of Stems

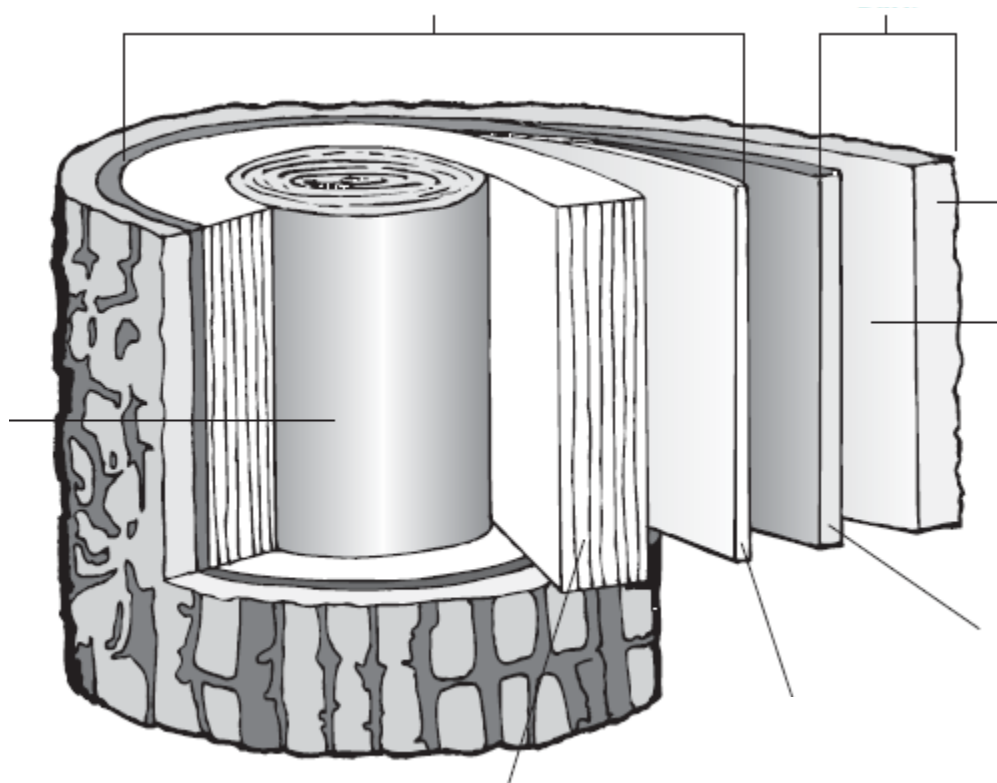
For Questions 8–17, write *True* if the statement is true. If the statement is false, change the underlined word or words to make the statement true.

- _____ 8. Plants grow in a way that is the same as the way animals grow.
- _____ 9. The number of legs an animal will have is predetermined, but the number of branches a plant will have is not predetermined.
- _____ 10. Primary growth of stems is the result of elongation of cells produced in the ground tissue.
- _____ 11. The increasing thickness of stems and roots in dicots and gymnosperms is called new growth.
- _____ 12. Secondary growth is common in monocots.
- _____ 13. Dicots can grow to great heights because the increase in width supports the weight.
- _____ 14. Vascular cambium forms between the xylem and phloem of the vascular bundles.
- _____ 15. In conifers and dicots, secondary growth takes place in stems and roots called the vascular cambium and cork cambium.
- _____ 16. The inner layers of a stem are produced by the cork cambium.
- _____ 17. Stems become thicker because the cambium produces new layers of vascular tissue each year.
18. **THINK VISUALLY** Complete the diagram of secondary growth by identifying the structures involved and where they appear. Label the primary xylem and phloem, the secondary xylem and phloem, and the wood and bark.



For Questions 19–23, complete each statement by writing the correct word or words.

19. Most of what we call “wood” is made up of layers of _____ xylem.
20. The dark wood that no longer conducts water is called _____.
21. The wood that is active in fluid transport is called _____.
22. The lighter wood in tree rings contains _____ cells with thin cell walls compared with the cells in darker wood.
23. Alternating layers of light wood and dark wood are used to estimate a tree’s _____.
24. **THINK VISUALLY** Complete the illustration showing the formation of wood and bark. Use the following terms: wood, bark, cork, cork cambium, vascular cambium, phloem, heartwood, and sapwood.



Apply the Big idea

25. “Girdling” is a term that refers to removing the bark of a tree in a complete ring around the trunk or a branch. Predict the effect that girdling will have on a tree. Explain.
