

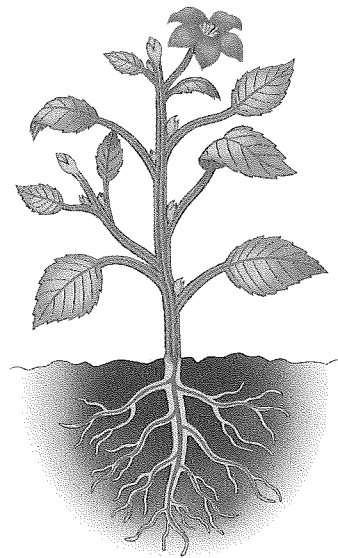
Name \_\_\_\_\_ Period \_\_\_\_\_

## Chapter 35: Plant Structure, Growth, and Development

In this chapter, we have selected basic information about plant structure, growth, and development to allow you to understand how certain fundamental processes work in plants. For example, knowing the morphology of a typical root tip will help visualize the slides you look at when studying mitosis. Knowing the anatomy of the leaf puts information about photosynthesis into perspective. Mechanisms of cell signaling, gene regulation, and development are common to plants as well as animals, so continue to think about the unity and diversity of life.

### *Concept 35.1 Plants have a hierarchical organization consisting of organs, tissues, and cells*

1. This concept is organized into three sections—plant organs, tissues, and cells. Begin by defining a *tissue* and an *organ*.
2. The three plant organs are \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
3. On the following figure (Figure 35.2 in your text), label the *shoot system*, *apical bud*, *axillary bud*, and *root system*.

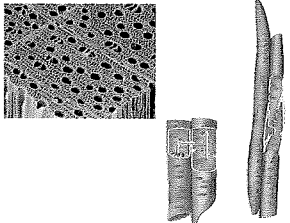


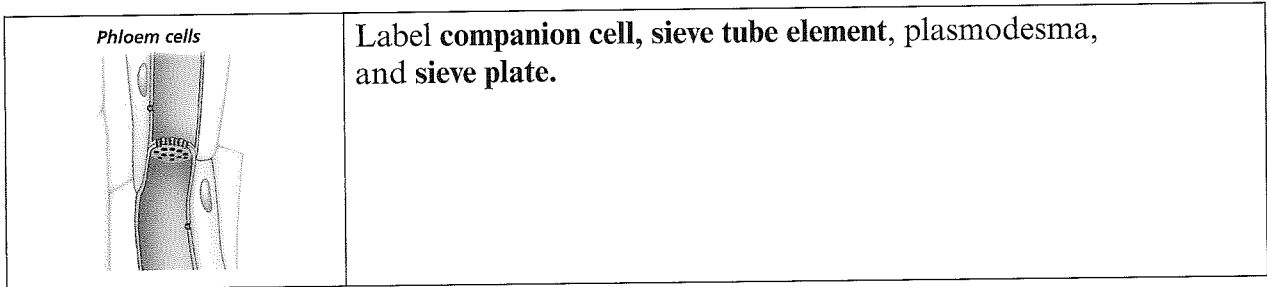
4. What are three important functions of the *root*?

5. Figure 35.3 in your text shows the *root hairs* of a radish. What is the function of *root hairs*?
6. What is the general function of stems? What are some specialized evolutionary adaptations of stems?
7. What is the main function of the *leaf*?
8. Plants have three types of tissues. Place the name of each tissue type and its function in the following table.

Tissue Type	Function

9. What is the function of the *cuticle*?
10. Name the two vascular tissues, and give the function of each.
11. Xylem transport tends to be in one direction, but *phloem* transport is more complicated. Explain the pattern of sugar flow in phloem tissue.
12. The two major tissues of the *ground tissue system* are *pith* and *cortex*. Where are they found in the plant?
13. Plants have five major types of cells. In the following figure you will find the two types of vascular tissue, xylem and phloem. Label as indicated and give the major function of each cell type. Which cells are alive at maturity?

Plant Cells	Function
<p><i>Xylem cells</i></p> 	<p>Label <b>vessel elements</b>, <b>tracheids</b>, and <b>pits</b>.</p>



14. At the end of this first extensive concept, do not lose sight of the big picture. Complete the following summary charts.

The three plant organs are

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The three basic plant tissues are

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*Concept 35.2 Different meristems generate new cells for primary and secondary growth*

15. What is the difference between *indeterminate growth* and *determinate growth*?
16. Although plants generally show indeterminate growth, what are three examples of plant parts that show determinate growth?
17. What are *meristems*?
18. Explain the following relationships.

**apical meristems and primary growth**

**lateral meristems and secondary growth**

**primary growth and secondary growth**

**Study Tip**

**Only cells in plant meristems are capable of division! If you placed a basketball goal 10 feet off the ground on a tree, the goal would always remain at that height. The plant is growing upward only from the terminal meristems.**

19. Based on the length of their life cycle, plants are categorized into three groups. Explain what each category means below, and provide an example.

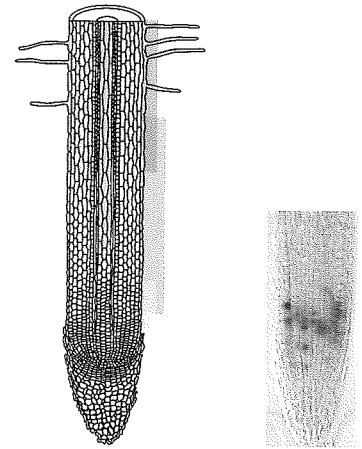
**annuals**

**biennials**

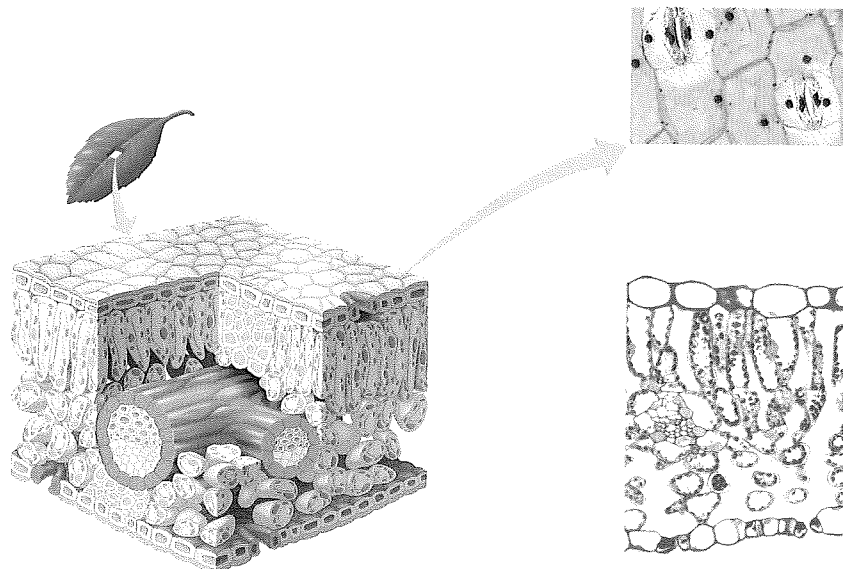
**perennials**

**Concept 35.3 Primary growth lengthens roots and shoots**

20. The figure on the right shows an image similar to a slide many students study in a mitosis lab and is labeled for this lesson as the “Primary growth of a root.” Label the following structures shown in the figure: *vascular cylinder*, *epidermis*, *apical meristem*, *root cap*, *root hair*, *zone of differentiation*, *zone of elongation*, and *zone of cell division*. When looking for the stages of mitosis, what is the only area that will show cell division?



21. Using Figure 35.16 on page 763 in your text, locate the shoot apical meristem, leaf primordia, young leaf, developing vascular strand, and axillary bud meristems. What structure in the figure is responsible for primary growth?
22. How is the arrangement of vascular bundles different in monocot and dicot stems?
23. To understand the process of photosynthesis, you will need to know leaf structure in detail. Use Figure 35.18 in your text to label each structure just as shown in the text.



24. What gas critical to photosynthesis enters the leaf through stomata?
25. What is lost through stomata in transpiration?

**Concept 35.4 Secondary growth increases the diameter of stems and roots in woody plants**

26. Primary growth arises from apical meristems and results in elongation of roots, stems, and leaves. However, plants increase in thickness by secondary growth from *lateral meristems*. There are two types of lateral meristems, *vascular cambium* and *cork cambium*. Explain what is produced in each.

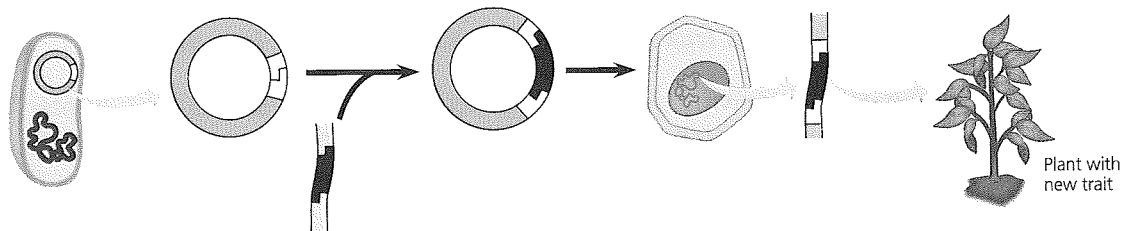
**vascular cambium**

**cork cambium**

27. Read the text that accompanies Figure 35.19 in your book and then answer these questions:
  - a. What results in primary growth of the stem?
  - b. Is xylem formed to the outside or inside of the *vascular cambium*? Is the phloem formed to the outside or inside of the vascular cambium?
28. What vascular tissue forms the *bark*, and what is the function of the *bark*?
29. Look at the stem in Figure 35.19 and find the horizontal slits in the bark, known as *lenticels*. You may have noticed lenticels on the young twigs of trees or shrubs. What is the function of *lenticels*?

**Concept 35.5 Growth, morphogenesis, and cell differentiation produce the plant body**

30. Figure 35.25 shows how the Ti plasmid is used to produce transgenic plants. Note that the basic procedure is quite similar to inserting a gene into an animal cell. Label the figure, then describe the three key techniques.



31. We should also call to your attention that gene expression and cell differentiation in plants mirror what you already have learned concerning animals. Read the section on this topic, page 773, carefully. Complete the following to emphasize this commonality:

Cell differentiation depends on the control of \_\_\_\_\_, the regulation of \_\_\_\_\_ and \_\_\_\_\_, resulting in the production of specific proteins.