Chapter 2 Summary

2.1 Plant Cells, Tissues, and Organs

Key Concepts

- Meristems (groups of meristematic cells) produce cells that differentiate into specialized cells.
- New tissues and organs are produced from meristematic tissue in growing areas called buds.
- Plant tissues join together into four types of organs: the root, stem, leaf, and reproductive organ.
- Leaves provide a large surface area where photosynthesis takes place. Photosynthesis occurs inside chloroplasts, which are found in specialized cells in the leaf.
- Stems support the plant and transport water, nutrients, and sugars.
- Roots anchor the plant and take up minerals and water from the soil.
- Not all plants have flowers. In those that do, flowers are responsible for reproduction.

2.2 Plant Organ Systems

Key Concepts

- Plants have two organ systems for sustaining life: the root system and the shoot system.
- The root system takes in water and nutrients from the soil and moves these substances to the stem.
- The shoot system supports the plant, performs photosynthesis, and transports water, nutrients, and sugars.
- Water moves through the plant due to transpirational pull and root pressure, aided by two properties of water–cohesion and adhesion.
- Nutrients in the form of dissolved sucrose move through the plant in the phloem tissue. The sucrose is stored as starch if it is not needed immediately.

Chapter 2 Review

Make Your Own Summary

Summarize the key concepts of this chapter using a graphic organizer. The Chapter Summary on the previous page will help you identify the key concepts. Refer to Study Toolkit 4 on pages 565–566 to help you decide which graphic organizer to use.

Reviewing Key Terms

1. The _____ protects the inner tissues of the leaf. (2.1)

2. Specialized cells form during _____, which is a stage of development. (2.1)

3. _____ cells can give rise to various specialized cells in a plant. (2.1)

4. Roots, stems, and leaves are all plant _____. (2.1)

5. A plant _____ can be compared to a tumour in an animal. (2.1)

6. An organ _____ co-ordinates the functions of organs to do a complex job for an organism. (2.2)

7. Plants have two organ systems: the _____ system and the _____ system. (2.2)

Knowledge and Understanding K/U

8. How are new tissues and organs produced through the life of a plant?

9. Describe a function of auxin in plant growth.

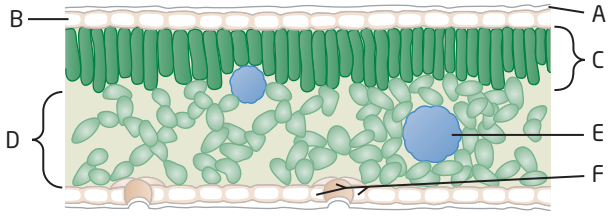
10. Explain how a plant tissue differs from a plant organ.

11. Note whether each of the following is a cell (or part of a cell), tissue, organ, or system, and state its function.

a. xylem vessel
b. leaf
c. fibrous roots
d. epidermis
e. root hair

12. Draw and label a diagram to show the function of the stomata and guard cells.

13. In your notebook, name the structures indicated in the stylized drawing of a leaf cross section below.



14. All plants must perform photosynthesis.

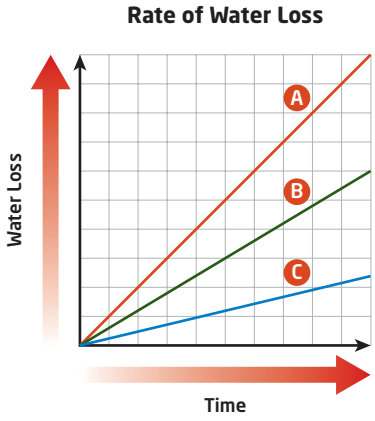
a. What materials are needed for this process?
b. Describe how the plant obtains these materials.

15. Explain how adhesion and cohesion affect the transport of water throughout a plant.

16. Using a Venn diagram, compare and contrast the two main types of roots and the environments in which you are likely to find them.

Thinking and Investigation T/I

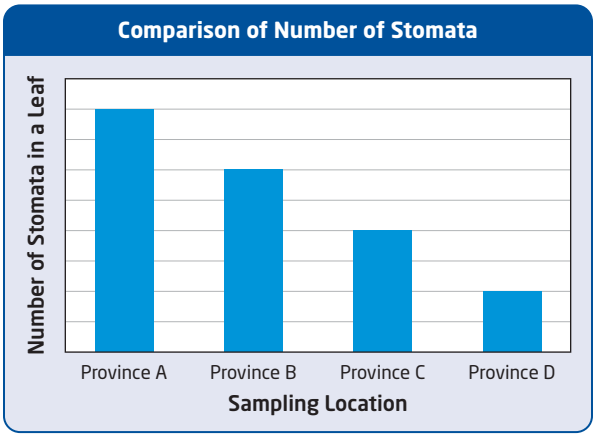
17. Researchers wanted to know if certain environmental conditions would affect water loss from plants. They set up an investigation using three potted geranium plants. They placed plant 1 in a clear plastic bag, and they placed plant 2 in front of a fan. Plant 3 served as a control. Study the graph, and answer the questions that follow.



a. Which line best represents each plant used in the investigation?

b. Do environmental conditions affect the rate of water loss in a plant? Write a conclusion for the experiment.

18. This graph shows the number of stomata in the leaves of daisies collected in four different provinces. In which province would you expect the least and the greatest amount of rainfall? Why?



19. If a houseplant outgrows its pot, it often wilts. Why?

20. Predict the results of an experiment in which a scientist compared the thickness of the cuticles of terrestrial plants that live in hot, dry areas to the thickness of cuticles of terrestrial plants that live in humid, rainy areas. Explain your reasoning.

21. What tissues do you think make up the fibrous "strings" in celery? How could you set up a simple experiment to find out what the function of the "strings" is?

Communication C

22. BIG IDEAS "Plants and animals, including humans, are made of specialized cells, tissues, and organs that are organized into systems." Use this statement as the caption for a diagram you create, using plants as the example.

23. Sketch a diagram to show how water and nutrients enter a plant, and how these substances are transported from the roots to the leaves. Write a description of the process, referring to your diagram.

24. Write an editorial column for your school newspaper, explaining why the school board should adopt a policy of only watering schoolyards in the cool of the night.

25. Describe the benefits and risks of a high rate of transpiration.

Application A

26. To be able to perform photosynthesis, cells need chloroplasts.

a. Using this information, describe the difference between the cells specialized for photosynthesis and non-photosynthetic cells.

b. How could you extend this information to determine which structures in a plant participate in photosynthesis?

27. Water usually does not carry much dissolved oxygen. How does this fact explain why plants can be killed by watering them too much?

28. A friend tells you that you can make an unripened peach ripen faster by putting it in a paper bag than by leaving it on a counter. Do you think your friend is correct? Explain your reasoning.

29. Why do you think farmers dry their grain before they store it?

30. Which diagram shows a method of watering a garden that makes the best use of the water? Explain your answer.