Chapter 7 Review

READING TOOLBOX

1. **Word Families** The prefix *cyto-* means "cell." Find three words in this chapter that belong to this family, and write a definition for each word.
2. **Concept Map** Make a concept map that compares plant cells with animal cells. Include the following terms in your concept map: *cell membrane, cell wall, central vacuole, chloroplasts,* and *mitochondria.*

Using Key Terms

3. Use the following terms in the same sentence: *prokaryote, eukaryote,* and *nucleus.*

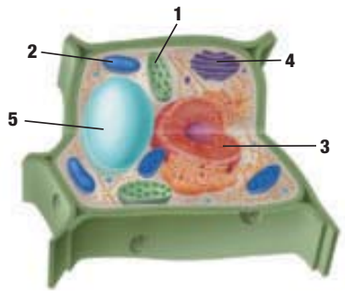
For each pair of terms, explain how the meanings of the terms differ.

4. *organelle* and *organ*
5. *tissue* and *colonial organism*

Understanding Key Ideas

6. The maximum size of a cell is determined by the ratio of the cell's
   a. volume to organelles.
   b. cytoplasm to nucleus.
   c. surface area to volume.
   d. cytoplasm to organelles.
7. What four features do prokaryotic and eukaryotic cells share?
   a. cytoplasm, nucleus, ribosomes, vesicles
   b. DNA, nucleus, ribosomes, mitochondria
   c. nucleus, vesicles, mitochondria, cell membrane
   d. DNA, cytoplasm, ribosomes, cell membrane.
8. What makes up the cytoskeleton?
   a. bones **c.** proteins
   b. flagella **d.** cellulose
9. The function of ribosomes is to
   a. copy DNA. **c.** organize the nucleus.
   b. assemble proteins. **d.** store genetic material.
10. Which specialized structures allow prokaryotes to move quickly through their environment?
    a. pili **c.** flagella
    b. nuclei **d.** mitochondria
11. Which of the following best describes an organ?
    a. a body structure, such as an arm or a leg
    b. a group of cells that have a similar structure
    c. a group of tissues that belong to different systems
    d. a group of tissues that work together to perform a specific job

Use the diagram to answer the following question(s).



12. Which structure helps modify proteins?
    a. structure 1 **c.** structure 3
    b. structure 2 **d.** structure 4
13. What is structure 5?
    a. vacuole **c.** ribosome
    b. nucleus **d.** chloroplast

Explaining Key Ideas

14. **Describe** two observations of early scientists that support the cell theory.
15. **Describe** how the structure of membranes in chloroplasts and mitochondria contributes to the function of these organelles.
16. **Propose** why muscle cells have more mitochondria than other kinds of eukaryotic cells do.
17. **List** four ways in which prokaryotic cells may vary.
18. **Explain** how a unicellular organism and a multicellular organism differ in the way life processes are carried out by an individual cell.

Assignment Guide

Section	Questions
1	1, 3, 4, 6, 7, 14, 19, 20, 26, 27, 29, 32, 33, 34
2	1, 2, 8, 9, 12, 13, 15, 16, 21, 22, 23, 24, 25, 26
3	2, 4, 5, 10, 11, 16, 17, 18, 26, 28, 30, 31, 32, 33, 34

Review

Reading Tool Box

1. cytoplasm–the region of the cell within the membrane; cytosol–the fluid inside of the cell, not including the organelles; cytoskeleton–the web of protein fibers that support the cell
2. See previous page for answer to concept map.

Using Key Terms

3. A *eukaryote* differs from a *prokaryote* in that most eukaryotic cells have a *nucleus.*
4. An *organelle* is a structure inside a cell that performs a specific function for the cell. An *organ* is made of cells and tissues, and performs a specific function for the organism.
5. A *tissue* is a group of similar cells that perform a common function. A *colonial organism* is a collection of genetically identical cells that do not coordinate their activities.

Understanding Key Ideas

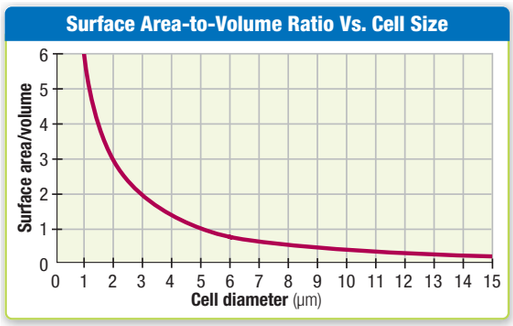
6. c 7. d 8. c 9. b
10. c 11. d 12. d 13. a

Explaining Key Ideas

14. All living things are made of cells. Cells are the basic units of structure and function in living things. Cells arise only from other cells. Schleiden found all plants to be made of cells; Schwann made a similar observation for animals.
15. Chloroplasts and mitochondria both have an inner membrane that is greatly folded. ATP-producing enzymes are located on the folds of the inner membrane. Because the membrane is greatly folded, it can hold many of these enzymes, and the organelle can therefore produce large amounts of ATP.
16. Muscle cells require a great deal of energy (ATP), which is supplied mainly by mitochondria.
17. Prokaryotes may vary in shape, the way they obtain and use energy, the makeup of their cell walls, and their ability to move.
18. A unicellular organism must perform all life functions itself. A multicellular organism has specialized cells to carry out different functions. A single cell of a multicellular organism may be too specific to carry out all life processes individually.

Using Science Graphics

This graph shows the relationship between cell size and surface area–to-volume ratio. Use the graph to answer the following question(s).



19. By what percentage does the surface area–to-volume ratio change when a cell grows from 1 μm to 2 μm in diameter?

a. 10 percent **c.** 50 percent
b. 20 percent **d.** 90 percent

20. What is the maximum diameter that this cell could reach before the surface area–to-volume ratio would fall below 1?

a. 2 μm **c.** 10 μm
b. 5 μm **d.** 15 μm

Critical Thinking

21. Making Connections Connective tissue in the human body holds organs in place. Which structure within a cell is similar to connective tissue?

22. Predicting Outcomes What would happen if the nuclear pores of the cell became blocked?

23. Constructing Explanations Some ribosomes are bound to rough ER, while other ribosomes float freely in the cytoplasm. How would the products of these two types of ribosomes likely differ in appearance, and why?

24. Making Comparisons Compare and contrast the functions of the endoplasmic reticulum and the Golgi apparatus.

25. Explaining Relationships Describe how a food vacuole and lysosome work together to capture and digest food.

26. Comparing Functions Identify the structural elements that hold the shape of a prokaryotic cell, an animal cell, and a plant cell.

27. Applying Information Drugs that rid the body of eukaryotic parasites often have more side effects and are harder on the body than drugs that act on bacterial parasites. Suggest a reason for this difference.

28. Evaluating Hypotheses One of your classmates states a hypothesis that all organisms must have organ systems. Is your classmate's hypothesis valid? Explain your answer.

Methods of Science

29. Technology Explain how the development of the microscope has contributed to the study of biology. Describe how the discovery of cells led to the advancements in technology.

Alternative Assessment

30. Owner's Manual Pick an organ system in the human body. Draw a poster that shows the levels of organization. Write an owner's manual explaining what each part is and how the parts fit together.

31. Advertisement Imagine that you have the ability to convert unicellular organisms into multicellular organisms. Make an advertisement that sells your service to unicellular organisms. Be sure to include at least three advantages of being multicellular.

Math Skills

Volume Suppose that a cube-shaped multicellular organism exists. Each of its cells is a cube that has a volume of 1 cm^3. Each side of the organism is 3 cm long.

32. What is the total volume of this organism?

33. How many cells does this organism have?

34. If each side of the organism doubles in length, how many 1 cm^3 cells will the organism have?

Using Science Graphics

19. c **20.** b

Critical Thinking

21. cytoskeleton *intermediate fibers*

22. The cell would die because mRNA would not be able to pass into the cytoplasm.

23. The products of ribosomes bound to rough ER would be enclosed in a vesicle, while the products of unbound ribosomes would not be.

24. The ER moves proteins to the Golgi apparatus. The Golgi modifies those proteins then moves them to other parts of the cell.

25. A food vacuole is a vesicle containing food particles. A lysosome is a vesicle that contains digestive enzymes. When the membranes of both vesicles fuse, their contents mix and the digestive enzymes break down the food particles into nutrients for the cell.

26. The cell wall holds the shape of a prokaryotic cell. The cytoskeleton helps an animal cell maintain its shape. The cytoskeleton, central vacuole, and cell wall help a plant cell maintain its shape.

27. Antibiotics can kill bacterial cells without harming human cells. Drugs that kill eukaryotic parasites may also harm eukaryotic human cells.

28. not valid; unicellular organisms have no tissues, organs, or organ systems

Methods of Science

29. Microscope technology helped identify the basic unit of living things. It also helped determine the microstructure of the cell and the functions of organelles.

Alternative Assessment

30. Organs in the digestive system would include the stomach and intestines. These organs are made up of tissues, such as muscle tissue and nerve tissue. Muscle tissue is made of cells that can contract and expand to produce movement. Nerve tissue is made up of cells with long extensions that can send electrical impulses.

31. Cell specialization allows some cells to concentrate on digestion while others do respiration or circulation. This allows each cell to function at maximum efficiency. A multicellular organism may grow larger than a unicellular organism. Size can be an advantage in a prey predator scenario. The death of one cell in a multicellular organism does not mean the death of the organism.

Math Skills

32. 3 cm × 3 cm × 3 cm = 27 cm^3.

33. 27 cm^3/1 cm^3 = 27 cells.

34. If each side doubles in length, the organism will have 216 cells (6 cm × 6 cm × 6 cm = 216 cm^3

216 cm^3/1 cm^3 = 216 cells). Students struggling with this question should review the math skills feature and text in section 7.1.