

## Lesson 7.1

### UNDERSTAND KEY CONCEPTS

1. d
2. b
3. b
4. Tables can have two columns. Left column head should be Scientist, with rows Hooke, Schleiden, Schwann, and Virchow. Right column head should be Contribution, with rows cork "cells," plants made of cells, all animals made of cells, existing cells divide to make new cells.

### THINK CRITICALLY

5. a light microscope
6. Alike: both have a cell membrane, DNA, and ribosomes; Different: prokaryotic DNA is not found in a nucleus.

## Lesson 7.2

### UNDERSTAND KEY CONCEPTS

7. c      8. b      9. a

10. Students' drawings should be similar to the nucleus in **Figure 7-7**, with nuclear membrane, nuclear pores, nucleolus, and chromatin labeled and their functions identified.
11. Ribosomes assemble proteins according to coded directions from DNA.
12. The Golgi apparatus modifies, sorts, and packages proteins and other materials from the ER for storage or release through the cell membrane.

### THINK CRITICALLY

13. Because enzymes are proteins, ribosomes, the endoplasmic reticulum, and the Golgi apparatus would be involved in producing them.
14. Prokaryotes (Pro) and Eukaryotes (Eu)  
cell membrane: Pro and Eu  
mitochondria: Eu  
ribosome: Pro and Eu  
Golgi apparatus: Eu  
nucleus: Eu  
cytoplasm: Pro and Eu  
DNA: Pro and Eu

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## Lesson 7.3

### UNDERSTAND KEY CONCEPTS

15. d      16. c

17. In diffusion, particles move randomly from areas of higher concentration to areas of lower concentration until equilibrium is reached. At equilibrium, the concentration is more or less the same throughout.
18. Osmosis is the diffusion of water through a selectively permeable membrane. Only water can move by osmosis.
19. Passive transport acts to equalize concentrations on both sides of the membrane and does not require energy. Active transport requires energy and moves materials against a concentration gradient.

### THINK CRITICALLY

20. The diffusing salt particles (the sodium and chloride ions that make up salt) and water molecules will eventually reach equilibrium without a change in the fluid on either side.
21. The blood cells would swell and burst, because the concentration of solute is higher inside the cells than in the solution outside. Therefore, the solution outside the cells would tend to diffuse into the cells.
22. Answers may vary. Students might hypothesize that diffusion will take place most rapidly in the beaker with hot water.

Experiments should include the following steps: Drops of food coloring will be placed in the beakers at the same time, and the same number of drops will be placed in each beaker. Diffusion in the three beakers will be observed and compared after a set amount of time; alternatively, the time that it takes each beaker to reach a uniform color will be measured.

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## Lesson 7.4

### UNDERSTAND KEY CONCEPTS

23. c      24. a

25. In multicellular organisms, each cell has a specialized role to play to maintain homeostasis, so all cells must work together to maintain homeostasis.
26. Groups of similar cells that perform a particular function form tissues. Different types of tissues that perform a specific function work together as an organ. A group of organs that work together for a specific function form an organ system.

### THINK CRITICALLY

27. Predictions should say that muscle cells contain more mitochondria. Because muscle cells are responsible for movement, they require more energy than skin cells.
28. If a person needs a pacemaker, his or her heart cells may have lost some of their ability to send chemical messages or to respond to messages.

## Connecting Concepts

### USE SCIENCE GRAPHICS

29. Prokaryotes: *Escherichia coli*, *Streptococcus pneumoniae*  
Eukaryotes: human erythrocyte, human ovum, *Saccharomyces cerevisiae*
30. In general, prokaryotes are much smaller than eukaryotes.
31. Based upon size, *Chlamydomonas reinhardtii* is likely to be a eukaryote.

### WRITE ABOUT SCIENCE

32. Sample answer: Companies that market high-solute drinks should not say that the drinks quench thirst. If you drink something with a high solute concentration, water will move out of the body cells and into the bloodstream. This can actually increase thirst.
33. Active transport is one way in which organisms maintain homeostasis. For example, an amoeba uses phagocytosis to take in food. The amoeba needs the food for energy and growth.

## Analyzing Data

**PURPOSE** Students will calculate the relative size of molecules and hypothesize how the size of molecules affects their diffusion.

**PLANNING** Review how to calculate percent differences. Then, compare specific percent differences with more familiar indicators of difference, e.g., by equating a twofold increase with a 100 percent increase.

### ANSWERS

34. c

35. d

## Answers

1. B
2. A
3. C
4. D
5. B
6. D
7. A
8. D
9. A
10. D
11. A typical cell in fresh water will take in water, swell, and may burst.