USING KEY TERMS
Complete each of the following sentences by choosing the correct term from the word bank.

- red blood cells
- veins
- white blood cells
- arteries
- lymphatic system
- larynx
- alveoli
- bronchi
- respiratory system
- trachea

1. ____________________ deliver oxygen to the cells of the body.

2. ____________________ carry blood away from the heart.

3. The ____________________ helps the body fight pathogens.

4. The ____________________ contains the vocal cords.

5. The pathway of air through the respiratory system ends at the tiny sacs called ____________________.

UNDERSTANDING KEY IDEAS
Multiple Choice

_____ 6. Blood from the lungs enters the heart at the
   a. left ventricle.           c. right atrium.
   b. left atrium.            d. right ventricle.

_____ 7. Blood cells are made
   a. in the heart.           c. from lymph.
   b. from plasma             d. in the bones.

_____ 8. Which of the following activities is a function of the lymphatic system?
   a. returning excess fluid to the circulatory system
   b. delivering nutrients to the cells
   c. bringing oxygen to the blood
   d. pumping blood to all parts of the body

_____ 9. Alveoli are surrounded by
   a. veins.              c. capillaries.
   b. muscles.           d. lymph nodes.
Chapter Review continued

10. What prevents blood from flowing backward in veins?
   a. platelets  
   b. valves  
   c. muscles  
   d. cartilage

11. Air moves into the lungs when the diaphragm muscle
   a. contracts and moves down.  
   b. contracts and moves up  
   c. relaxes and moves down.  
   d. relaxes and moves up.

Short Answer

12. What is the difference between pulmonary circulation and systemic circulation in the cardiovascular system?

13. Walton’s blood pressure is 110/65. What do the two numbers mean?

14. What body process produces the carbon dioxide you exhale?

15. Describe how the circulatory system and the lymphatic system work together to keep your body healthy.

16. How is the spleen important to both the lymphatic system and the circulatory system?

17. Briefly describe the path that oxygen follows in your respiratory system and your circulatory system.
CRITICAL THINKING

18. Concept Mapping  Use the following terms to create a concept map: 
   *blood, oxygen, alveoli, capillaries, and carbon dioxide.*
19. Making Comparisons  Compare and contrast the functions of the circulatory system and the lymphatic system.

________________________________________________________________________________________

20. Identifying Relationships  Why do you think there are hairs in your nose?

________________________________________________________________________________________

21. Applying Concepts  After a person donates blood, the blood is stored in one-pint bags until it is needed for a transfusion. A healthy person has about 5 million RBCs in each cubic millimeter (1 mm³) of blood.
   
   a. How many RBCs are in 1 mL of blood? (One milliliter is equal to 1 cm³ and to 1,000 mm³.)

________________________________________________________________________________________

   b. How many RBCs are there in 1 pt? (One pint is equal to 473 mL.)

________________________________________________________________________________________

22. Predicting Consequences  What would happen if all of the red blood cells in your blood disappeared?

________________________________________________________________________________________

23. Identifying Relationships  When a person is not feeling well, a doctor may examine samples of the person's blood to see how many white blood cells are present. Why would this information be useful?

________________________________________________________________________________________
INTERPRETING GRAPHICS

The diagram below shows how the human heart would look in cross section. Use the diagram to answer the questions that follow.

24. Which letter identifies the chamber that receives blood from systemic circulation? What is this chamber's name?

25. Which letter identifies the chamber that receives blood from the lungs? What is this chamber's name?

26. Which letter identifies the chamber that pumps blood to the lungs? What is this chamber's name?
7. Answers will vary. Sample answer: It is important for lymphatic tissue to be spread throughout the body so that fluid and particles from around every cell are removed and so that pathogens can be identified and attacked wherever they are in the body.

SECTION: THE RESPIRATORY SYSTEM
1. The pharynx is the passage from the mouth to the larynx and esophagus, while the larynx is the part of the throat that contains the vocal cords.
2. D
3. Answers will vary. Sample answer: When you breathe, air is sucked into or forced out of your lungs. A muscle called the diaphragm contracts and increases chest-cavity volume, which creates a vacuum. The vacuum pulls air in through the nose or mouth. Then, the air travels through the pharynx, larynx, trachea, and bronchi to reach the lungs.
4. Answers will vary. Sample answer: The respiratory system brings in oxygen and expels carbon dioxide, and the cardiovascular system transports those gases to and from the lungs.
5. \[ 6 \text{ L} - 3.6 \text{ L} = 2.4 \text{ L unexhaled} \]
   \[ 2.4 \text{ L} + 6 \text{ L} = 0.40, \text{ or } 40\% \text{ of TLC cannot be exhaled} \]
6. Answers will vary. Sample answer: These statistics tell us that, although a large number of children have asthma, not every child who has asthma has an asthma attack every year.
7. Answers may vary. Sample answer: The alveoli in the lungs are made for the exchange of gases, not liquids. Fluids in the lungs would prevent a person from getting all the oxygen he or she needed to maintain regular activity. The person might feel weak or tired. Also, the person could not get rid of the carbon dioxide from the cells, and that might cause a problem, too.

Chapter Review
1. red blood cells
2. arteries
3. lymphatic system
4. larynx
5. alveoli

6. B
7. D
8. A
9. C
10. B
11. A
12. Pulmonary circulation carries blood through the lungs and back to the heart. Systemic circulation carries blood from the heart to the rest of the body.
13. The first number, systolic pressure, is pressure in arteries when ventricles contract. The second number, diastolic pressure, is pressure in arteries when ventricles relax.
14. Carbon dioxide is a product of cellular respiration, which occurs in the body's cells.
15. Answers will vary. Sample answer: The circulatory system delivers oxygen, nutrients, and white blood cells to all parts of the body. The lymphatic system makes the white blood cells that fight disease.
16. The spleen is important to the circulatory system because it removes old or damaged red blood cells. The spleen is important to the lymphatic system because it stores white blood cells to help fight disease.
17. Oxygen comes into the body through the nose or mouth, travels to the lungs, and enters the alveoli. In the alveoli, oxygen moves through the capillary walls and enters the blood. The circulatory system carries the blood from the lungs to the heart, which pumps the blood to all parts of the body. Oxygen is carried by red blood cells to every body cell.
18. An answer to this exercise can be found at the end of the book.
19. Answers will vary. Sample answer: The circulatory system and the lymphatic system both use fluids to carry things to and from all parts of the body. The circulatory system delivers oxygen and nutrients to the cells and removes wastes from the cells. The lymphatic system helps fight disease and infection.
20. The hairs catch dust and other foreign particles. This helps keep your lungs as clean as possible.
21.  
a. 5 billion \((5,000,000,000)\) cells  
b. 2.365 trillion \((2,365,000,000,000)\) cells  

22. Answers may vary. Sample answer: In a short time, I would probably die because my body could not get the oxygen it needs.  

23. The immune system produces white blood cells to fight pathogens. A high white blood cell count tells the doctor the person may have an infection.  

24. A, the right atrium  
25. B, the left atrium  
26. B, the right ventricle  

Reinforcement  

MATCHMAKER, MATCHMAKER  

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<th>Can receive type A?</th>
<th>Can receive type B?</th>
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1. Answers will vary. Sample answer: I think a hospital would find type O blood the most useful because it can be given to anyone. 

COLORS OF THE HEART  

Critical Thinking  

DOCTOR FOR A DAY  

1. Answers will vary. Sample answer: Normal red blood cells are round and flexible. They contain hemoglobin molecules, which carry oxygen. Sickle cells are sticky and rigid, with abnormal hemoglobin molecules.  

2. Answers will vary. Sample answer: Rigid, sticky cells could cause blood clots. Abnormal hemoglobin may carry oxygen poorly. These problems can decrease the oxygen supply to tissues, leading to severe pain.  

3. Answers will vary. Sample answer: Because of their rigid structure, more sickle cells are destroyed in the spleen than normal cells are. Mr. Smith has needed transfusions to replace his broken sickle cells with normal red blood cells.  

4. Students will likely agree with the doctor. Make sure all answers are well supported with evidence. Answers will vary. Sample answer: Yes; the severe pain, the stroke, the blood clots, and the shortness of breath can be explained by a lack of oxygen to body tissues. The frequent blood transfusions can be explained by a decreased number of red blood cells in the body.  

5. Answers will vary. Sample answer: Yes; blood transfusions are not a permanent solution, because the patient still produces unhealthy red blood cells in the bone marrow. If successful, a bone marrow transplant would allow patients to produce their own healthy red blood cells. Frequent transfusions would no longer be needed.  

Section Quizzes  

SECTION: THE CARDIOVASCULAR SYSTEM  

1. D  
2. A  
3. C  
4. F  
5. B  
6. E  
7. A  
8. D  
9. C  

SECTION: BLOOD  

1. B  
2. A  
3. C  
4. B