Chapter 37  Circulatory and Respiratory Systems

Section 37–1  The Circulatory System  (pages 943–950)

Key Concepts

• What are the structures of the circulatory system?
• What are the three types of blood vessels in the circulatory system?

Functions of the Circulatory System  (page 943)

1. Why do large organisms require a circulatory system?  

2. What is a closed circulatory system?  

3. List the three components of the circulatory system.
   a.  
   b.  
   c.  

The Heart  (pages 944–946)

4. Is the following sentence true or false? The heart is composed almost entirely of muscle.

Match each heart structure with its description.

<table>
<thead>
<tr>
<th>Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>a. Thick layer of muscle in the walls of the heart</td>
</tr>
<tr>
<td>6.</td>
<td>b. Sac of tissue that encloses and protects the heart</td>
</tr>
<tr>
<td>7.</td>
<td>c. Upper chamber of the heart</td>
</tr>
<tr>
<td>8.</td>
<td>d. Lower chamber of the heart</td>
</tr>
</tbody>
</table>

9. Dividing the right side of the heart from the left side is a wall called a(an)  

10. Is the following sentence true or false? The heart functions as four separate pumps.  

11. Complete the table about the circulatory system.

<table>
<thead>
<tr>
<th>THE CIRCULATORY SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Circulatory Pathway</td>
</tr>
<tr>
<td>Pulmonary circulation</td>
</tr>
</tbody>
</table>

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12. What happens to blood when it reaches the lungs?

13. Why is the blood that enters the heart from the systemic circulation oxygen-poor?

14. Circle the letter of each sentence that is true about blood flow through the heart.
   a. Blood enters the heart through the right and left atria.
   b. Blood enters the heart through the right and left ventricles.
   c. Blood flows from the ventricles to the atria.
   d. Blood flows out of the heart through the right and left atria.

15. Flaps of connective tissue called __________________ prevent blood from flowing backward in the heart.

16. Each heart contraction begins in a small group of cardiac muscle cells called the ______________ node.

17. Cells that “set the pace” for the beating of the heart as a whole are also called the ______________.

**Blood Vessels** (pages 946–947)

18. Complete the concept map.

19. Circle the letter of each sentence that is true about arteries.
   a. Most carry oxygen-poor blood.
   b. They can expand under pressure.
   c. They have thin walls.
   d. The largest is the aorta.

20. The smallest blood vessels found in the body are the ______________.

21. What work is done in the capillaries? ______________

22. What keeps blood flowing toward the heart in the largest veins? ______________
23. The force of blood on the walls of arteries is known as _______________.

24. Is the following sentence true or false? Blood pressure increases when the heart relaxes. _______________

Match each type of blood pressure with the force it measures.

<table>
<thead>
<tr>
<th>Type of Pressure</th>
<th>Force It Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>25. systolic</td>
<td>a. Force of the blood when the ventricles relax</td>
</tr>
<tr>
<td>26. diastolic</td>
<td>b. Force of the blood when the ventricles contract</td>
</tr>
</tbody>
</table>

27. A typical blood pressure reading for a healthy person is _______________.

28. How does the autonomic nervous system regulate blood pressure? _______________

29. How do the kidneys regulate blood pressure? _______________

Diseases of the Circulatory System (pages 949–950)

30. A condition in which fatty deposits build up on the walls of arteries is called _______________.

31. High blood pressure also is called _______________.

32. Is the following sentence true or false? High blood pressure increases the risk of heart attack and stroke. _______________

33. Circle the letter of each sentence that is true about heart attack.
   a. It is caused by atherosclerosis in the coronary arteries.
   b. It occurs when part of the heart muscle begins to die.
   c. Its symptoms include nausea and chest pain.
   d. It requires immediate medical attention.

34. Is the following sentence true or false? A stroke may be caused by a clot in a blood vessel leading to the brain. _______________

35. List three ways of avoiding cardiovascular diseases.
   a. _______________
   b. _______________
   c. _______________
Section 37–2 Blood and the Lymphatic System
(pages 951–955)

Key Concepts
• What is the function of each type of blood cell?
• What is the function of the lymphatic system?

Blood Plasma (page 951)
1. The straw-colored fluid portion of blood is called ________________.
2. Plasma is about 90 percent water and 10 percent ________________

Match each type of plasma protein with its function.

<table>
<thead>
<tr>
<th>Type of Protein</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. albumin</td>
<td>a. Helps blood clot</td>
</tr>
<tr>
<td>4. globulin</td>
<td>b. Regulates osmotic pressure and blood volume</td>
</tr>
<tr>
<td>5. fibrinogen</td>
<td>c. Fights viral and bacterial infections</td>
</tr>
</tbody>
</table>

Blood Cells (pages 952–954)
6. List the three components of the cellular portion of blood.
   a. ________________    b. ________________    c. ________________

7. What is the role of red blood cells? ________________

8. What is hemoglobin? ________________

9. Is the following sentence true or false? Mature red blood cells have two nuclei.
   ________________

10. Circle the letter of each sentence that is true about white blood cells.
    a. They contain nuclei.
    b. They attack foreign substances.
    c. They contain hemoglobin.
    d. They are also called leukocytes.

11. Is the following sentence true or false? Most white blood cells live for an average of 120 days. ________________

12. White blood cells that engulf and digest foreign cells are called ________________.

13. What does a sudden increase in the number of white cells tell a physician?
   ________________
14. List the two components of blood that make clotting possible.
   a. __________________ b. __________________

15. Number the drawings below to show the correct sequence in which a blood clot forms when a blood vessel is injured.

   [Drawings showing stages of blood clotting]

   __________  __________  __________

16. A genetic disorder that results from a defective protein in the clotting pathway is ____________________.

**The Lymphatic System (pages 954–955)**

17. What is the lymphatic system? ____________________

18. The fluid lost by blood is called ____________________.

19. What is the function of lymph nodes? ____________________

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**Reading Skill Practice**

When you read a section with difficult material, writing a summary can help you identify and remember the main ideas and supporting details. Write a concise paragraph summing up the material under each heading in Section 37–2. Each of your paragraphs should be much shorter than the text under that heading in your book. Include each of the highlighted, boldface vocabulary terms in your summary. Do your work on a separate sheet of paper.
Section 37–3  The Respiratory System  (pages 956–963)

Key Concepts
- What is the function of the respiratory system?
- How does smoking affect the respiratory system?

What Is Respiration?  (page 956)
1. The process by which oxygen and carbon dioxide are exchanged between the lungs and the environment is known as ________________.

The Human Respiratory System  (pages 956–958)
2. What is the basic function performed by the human respiratory system? ____________

3. Label each of the following structures in the drawing of the human respiratory system: nose, pharynx, larynx, trachea, bronchus, and lung.

4. Circle the letter of the choice that lists the respiratory structures from largest to smallest.
   a. Alveoli, bronchioles, bronchi  c. Bronchi, bronchioles, alveoli
   b. Bronchioles, bronchi, alveoli  d. Bronchi, alveoli, bronchioles

5. What prevents food from entering your trachea? ________________________________

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Match each structure of the respiratory system with its description.

<table>
<thead>
<tr>
<th>Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. pharynx</td>
<td>a. Tiny air sacs where gas exchange occurs</td>
</tr>
<tr>
<td>7. trachea</td>
<td>b. Tiny projections that sweep trapped particles and mucus away from the lungs</td>
</tr>
<tr>
<td>8. cilia</td>
<td>c. Tube that serves as a passageway for both air and food</td>
</tr>
<tr>
<td>9. larynx</td>
<td>d. Large passageways in the chest that lead to the lungs</td>
</tr>
<tr>
<td>10. bronchi</td>
<td>e. Structure at the top of the trachea that contains the vocal cords</td>
</tr>
<tr>
<td>11. alveoli</td>
<td>f. Passageway between the pharynx and bronchi</td>
</tr>
</tbody>
</table>

Gas Exchange (page 958)

12. Gas exchange occurs in the ________________.

13. Describe the process of gas exchange. ______________________________________________________________

14. Circle the letter of each sentence that is true about gas exchange.
   a. It is a very efficient process.
   b. Exhaled air usually contains no oxygen.
   c. The lungs remove about half of the oxygen of inhaled air.
   d. The lungs increase the carbon dioxide content of inhaled air by a factor of 100.

15. Why is hemoglobin needed? ________________________________________________________________

Breathing (pages 959–960)

16. The movement of air into and out of the lungs is called ________________.

17. The large, flat muscle at the bottom of the chest cavity is the ________________.

18. Is the following sentence true or false? The force that drives air into the lungs comes from air pressure. __________

19. What happens when you inhale? ______________________________________________________________

20. What happens when pressure in the chest cavity becomes greater than atmospheric pressure? __________
How Breathing Is Controlled  (pages 960–961)
21. The part of the brain that controls breathing is the ______________________.
22. Is the following sentence true or false? Cells in the breathing center monitor the amount of oxygen in the blood. __________________
23. Why do airplane passengers in emergency situations often have to be told to begin breathing pressurized oxygen? ______________________

Tobacco and the Respiratory System  (pages 961–963)
24. List three of the most dangerous substances in tobacco smoke.
   a. __________________
   b. __________________
   c. __________________
25. Is the following sentence true or false? Nicotine is a stimulant drug that increases pulse rate and blood pressure. __________________
26. Why is carbon monoxide dangerous? ______________________
27. List three respiratory diseases caused by smoking.
   a. __________________
   b. __________________
   c. __________________
28. Circle the letter of each sentence that is true about chronic bronchitis.
   a. It is characterized by swollen bronchi.
   b. It occurs only in heavy smokers.
   c. It can make stair climbing and similar activities difficult.
   d. It is unrelated to smoking.
29. What is emphysema? ______________________
30. Circle the letter of each sentence that is true about lung cancer.
   a. Its most important cause is smoking.
   b. It is often deadly.
   c. It cannot spread to other parts of the body.
   d. It is usually detected early enough for a cure.
31. Circle the letter of each way that smoking affects the cardiovascular system.
   a. It constricts the blood vessels.
   b. It causes blood pressure to rise.
   c. It makes the heart work harder.
   d. It causes heart disease.

32. Inhaling the smoke of others is called ________________.

33. Why is passive smoking particularly harmful to young children? ________________

34. Why is it so hard to quit smoking? ________________________________

35. What is the best solution for dealing with tobacco? ________________________________

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**Reading Skill Practice**

When you read a section with many details, writing an outline may help you organize and remember the material. Outline Section 37–3 by first writing the section headings as major topics in the order in which they appear in the book. Then, beneath each major topic, list important details about it. Title your outline *The Respiratory System*. Do your work on a separate sheet of paper.