

Chapter 37

Circulatory and Respiratory Systems

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

This section describes the circulatory system and its functions.

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.

Structure	Description
_____ 5. pericardium	a. Thick layer of muscle in the walls of the heart
_____ 6. myocardium	b. Sac of tissue that encloses and protects the heart
_____ 7. atrium	c. Upper chamber of the heart
_____ 8. ventricle	d. Lower chamber of the heart

9. The heart pumps about _____ times per minute.
10. Dividing the right side of the heart from the left side is a wall called a(an) _____.
11. Is the following sentence true or false? The heart functions as four separate pumps. _____
12. Complete the compare/contrast table.

THE CIRCULATORY SYSTEM

Name of Circulatory Pathway	Side of Heart Involved	Route Blood Follows
Pulmonary circulation		From heart to lungs
	Left side	

13. What happens to blood when it reaches the lungs? _____

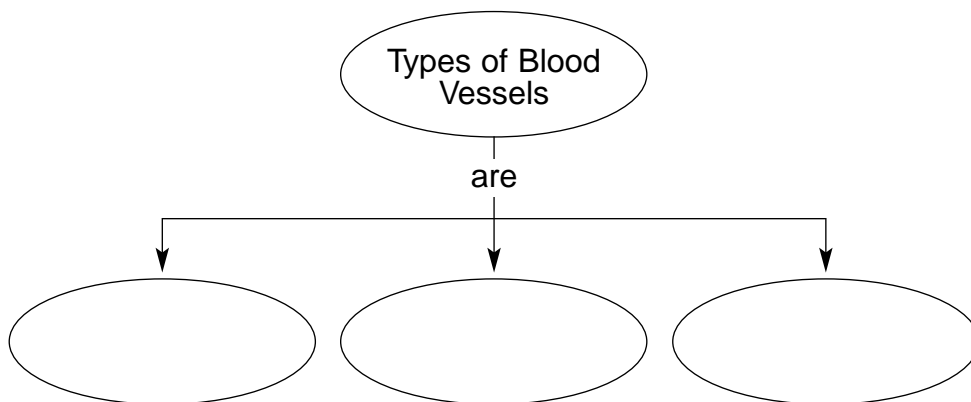
Chapter 37, Circulatory and Respiratory Systems (continued)

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

15. 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.
16. Flaps of connective tissue called _____ prevent blood from flowing backward in the heart.
17. Each heart contraction begins in a small group of cardiac muscle cells called the _____ node.
18. Cells that set the pace for the beating of the heart as a whole are called the _____.

Blood Vessels (pages 946–947)

19. Complete the concept map.



20. 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.
21. Is the following sentence true or false? The smallest of the blood vessels are the capillaries. _____
22. What work is done in the capillaries? _____

23. What keeps blood flowing toward the heart in the largest veins? _____

Blood Pressure (pages 948–949)

24. The force of blood on the walls of arteries is known as _____.

25. 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.

Type of Pressure	Force It Measures
_____ 26. systolic	a. Force of the blood when the ventricles relax
_____ 27. diastolic	b. Force of the blood when the ventricles contract

28. Is the following sentence true or false? An average adult’s blood pressure is 140/80. _____

29. How does the autonomic nervous system regulate blood pressure? _____

30. How do the kidneys regulate blood pressure? _____

Disorders of the Circulatory System (pages 949–950)

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

32. High blood pressure also is called _____.

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

34. 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.

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

36. List the four keys to avoiding cardiovascular disorders.

- a. _____
- b. _____
- c. _____
- d. _____

Chapter 37, Circulatory and Respiratory Systems *(continued)*

Section 37–2 Blood and the Lymphatic System (pages 951–955)

This section describes the functions of the different components of blood. It also outlines the role of the lymphatic system.

Blood Plasma (page 951)

1. The straw-colored fluid portion of blood is called _____.
2. Circle the letter of each sentence that is true about plasma.
 - a. It makes up 90 percent of the volume of blood.
 - b. It is about 55 percent water.
 - c. It contains only dissolved gases and salts.
 - d. It contains both nutrients and enzymes.

Match each type of plasma protein with its function.

Type of Protein	Function
_____ 3. albumin	a. Helps blood clot
_____ 4. globulin	b. Transports substances
_____ 5. fibrinogen	c. Fights infections

Blood Cells (pages 952–954)

6. List the three types of blood cells.
 - a. _____
 - b. _____
 - c. _____
7. Circle the letter of each sentence that is true about red blood cells.
 - a. They are the least numerous cells in the blood.
 - b. Their role is to transport oxygen.
 - c. They contain hemoglobin.
 - d. They are produced in the bone marrow.
8. Is the following sentence true or false? Mature red blood cells have two nuclei. _____
9. Circle the letter of each sentence that is true about white blood cells.
 - a. They contain a nucleus.
 - b. They attack foreign substances.
 - c. They contain hemoglobin.
 - d. They are also called leukocytes.
10. Is the following sentence true or false? Most white blood cells live for an average of 120 days. _____
11. White blood cells that engulf and digest foreign cells are called _____.

Match the type of white blood cell with its function.

Cell Type	Function
_____ 12. eosinophils	a. Produce antibodies
_____ 13. basophils	b. Attack parasites
_____ 14. lymphocytes	c. Release histamines

15. What does a sudden increase in the number of white cells tell a physician? _____
16. List the two components of blood that make clotting possible.
 a. _____ b. _____
17. Number the drawings below to show the correct sequence in which a blood clot forms when a blood vessel is injured.



18. A genetic disorder that results from a defective protein in the clotting pathway is _____.

The Lymphatic System (pages 954–955)

19. What is the lymphatic system? _____
20. The fluid lost by blood is called _____.
21. Circle the letter of each choice that is a function of lymph nodes.
- | | |
|--------------------------|--------------------------------------|
| a. Trapping bacteria | c. Preventing backward flow of lymph |
| b. Helping blood to clot | d. Producing lymphocytes |

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 boldfaced vocabulary terms in your summary. Do your work on a separate sheet of paper.

Chapter 37, Circulatory and Respiratory Systems (continued)

Section 37-3 The Respiratory System (pages 956-963)

This section identifies the structures of the respiratory system and explains how we breathe. It also describes how smoking affects the respiratory system.

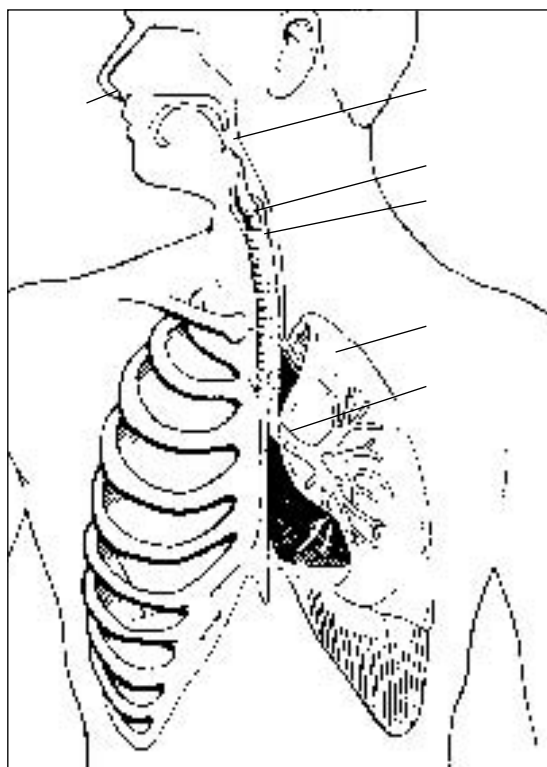
What Is Respiration? (page 956)

1. The process by which oxygen and carbon dioxide are exchanged between cells, the blood, and air in the lungs is known as _____.

The Human Respiratory System (pages 956-958)

2. What is the basic job 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
 - b. Bronchioles, bronchi, alveoli
 - c. Bronchi, bronchioles, alveoli
 - d. Bronchi, alveoli, bronchioles
5. What prevents food from entering your trachea? _____

Match each structure of the respiratory system with its description.

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

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. Circle the letter of the choice that describes what happens when pressure in the chest cavity becomes greater than atmospheric pressure.
- a. Air rushes into the lungs.
 - b. Air cannot escape from the lungs.
 - c. The diaphragm contracts.
 - d. Air rushes out of the lungs.

Chapter 37, Circulatory and Respiratory Systems (continued)

How Breathing Is Controlled (pages 960–961)

21. The brain controls breathing in a center located in 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? _____
- _____

WordWise

Match each definition in the left column with the correct term in the right column. Then, write the number of each term in the box below on the line under the appropriate letter. When you have filled in all the boxes, add up the numbers in each column, row, and two diagonals. All the sums should be the same.

Definition

- A. Fluid lost by the blood into surrounding tissue
- B. Thick layer of muscle in walls of heart
- C. Stimulant drug in tobacco smoke
- D. Passageway leading from the trachea to a lung
- E. Protein in red blood cells
- F. Small group of heart cells that set the pace for the heartbeat
- G. Lower chamber of the heart
- H. Disease in which tissues of the lungs lose elasticity
- I. Condition in which fatty deposits build up on the walls of arteries

Term

- 1. myocardium
- 2. ventricle
- 3. pacemaker
- 4. atherosclerosis
- 5. hemoglobin
- 6. lymph
- 7. bronchus
- 8. nicotine
- 9. emphysema

A	B	C	=	_____
_____	_____	_____	=	_____
D	E	F	=	_____
_____	_____	_____	=	_____
G	H	I	=	_____
_____	_____	_____	=	_____
=	=	=	=	_____
_____	_____	_____	=	_____