

Study Guide

Interactive Textbook

- Interactive Student Edition
- Self-Assessment with remediation
- Assessment reports for teachers

Apply the BIG Idea

Connect to Key Concepts

Reinforce the chapter's Big Idea by connecting it to important Key Concepts. For example, ask: **In what organs does gas exchange between the body and the environment take place?** (*The lungs*) **In what structure in these organs does this occur?** (*The alveoli*)

Teaching Resources

Teaching Resources, Unit 4

- Chapter 14 Key Terms Review
- Chapter 14 Vocabulary Skill

Color Transparencies

- Transparency 7.161

Chapter Tests Levels A and B

- Chapter 14 Tests
- Chapter 14 Performance Assessment

Standards Review Transparencies

Progress Monitoring Assessment

- Screening, diagnostic, and benchmark tests



For: Self-Assessment
Visit: PHSchool.com
Web Code: cva-4140

Students can take a practice test online that is automatically scored.

Key

AA Active Art
RNG-A Reading and Note Taking Guide, Level A
RNG-B Reading and Note Taking Guide, Level B
TR Teaching Resources

Chapter 14

Study Guide

The BIG Idea

The circulatory and respiratory systems move blood through the body and enable the exchange of gases.

1 The Body's Transport System

Key Concepts

S 7.5.a, 7.6.j

- The cardiovascular system carries substances to cells and away from cells. In addition, blood contains cells that fight disease.
- The heart pushes blood through the cardiovascular system. The two sides of the heart are separated by the septum. Each side has an upper chamber and a lower chamber.
- Blood circulates in two loops. First, it travels from the heart to the lungs and then back to the heart. Second, it is pumped from the heart to the body and then it returns to the heart.
- Blood leaves the heart through arteries. Materials are exchanged between the blood and the body's cells in the capillaries. Veins carry blood back to the heart.

Key Terms

- cardiovascular system • heart • atrium
- pacemaker • ventricle • valve • artery
- capillary • vein • aorta • coronary artery
- pulse • diffusion • pressure • blood pressure

2 Blood and Lymph

Key Concepts

S 7.5.a, 7.5.b

- Blood is made up of four components: plasma, red blood cells, white blood cells, and platelets.
- Marker molecules on red blood cells determine blood type and the type of blood that you can safely receive in transfusions.
- The lymphatic system is a network of vein-like vessels that returns the fluid to the bloodstream.

Key Terms

- plasma • red blood cell • hemoglobin
- white blood cell • platelet • shock
- lymphatic system • lymph • lymph node

3 The Respiratory System

Key Concepts

S 7.5.a, 7.5.b

- The respiratory system moves oxygen from the outside environment into the body. It also removes carbon dioxide and water.
- As air travels from the outside environment to the lungs, it passes through the following structures: nose, pharynx, trachea, and bronchi.
- Oxygen passes through the walls of the alveoli and then through the capillary walls into the blood. Carbon dioxide and water pass from the blood into the alveoli.
- When you breathe, the actions of your rib muscles and diaphragm cause your chest to expand or contract. Thus, air flows in or out.

Key Terms

- respiration • mucus • cilia • pharynx
- trachea • bronchi • lungs • alveoli
- diaphragm • larynx • vocal cords

4 Cardiovascular and Respiratory Diseases

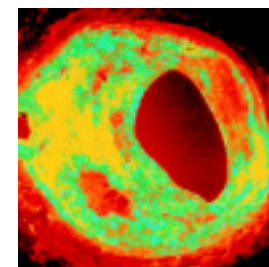
Key Concepts

S 7.5.b

- Diseases of the cardiovascular system include atherosclerosis and hypertension.
- Tobacco smoke damages the respiratory system, resulting in such diseases as emphysema, cancer, and chronic bronchitis.
- Diseases such as asthma, colds, influenza, and pneumonia are caused by infections or other physical conditions.

Key Terms

- atherosclerosis
- heart attack
- hypertension
- stroke
- emphysema
- bronchitis
- asthma
- suffocation
- pneumonia



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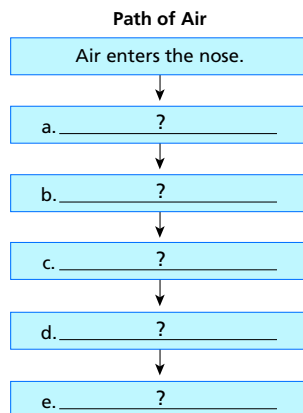
Diagnose and Remediate

Also available on Success Tracker

Standard	Review and Assessment Items	Standards-Targeted Resources	Additional Resources
S 7.5.a	3, 4, 7, 8, 9, 11, 13, 14, 15, 17, 18, 22	AA cep-4031; AA cep-4041; RNG-A 261–276; RNG-B 220–232; Video Field Trip	Teaching Resources: Vocabulary Skill
S 7.5.b	3, 4, 5, 7, 8, 9, 10, 15, 16, 17, 18, 19, 20	RNG-A 267–281; RNG-B 225–235	Teaching Resources: Key Terms
S 7.6.j	1, 2, 6, 11, 12, 17, 21, 23, 24, 25	AA cep-4031; RNG-A 261, 263, 266; RNG-B 221, 224; Video Field Trip	Student Edition in MP3 (English/Spanish)
			Student Express with Interactive Textbook CD-ROM

Target Reading Skill

Sequence Copy the flowchart below. Use it to describe the path of air through the body. End with air entering the alveoli.



Reviewing Key Terms

Choose the letter of the best answer.

- The heart's larger pumping chambers are called
 - ventricles.
 - atria.
 - valves.
 - arteries.
- The alternating expansion and relaxation of the artery that you feel in your wrist is your
 - pulse.
 - coronary artery.
 - blood pressure.
 - plasma.
- Blood components that transport oxygen in the body are
 - platelets.
 - red blood cells.
 - white blood cells.
 - plasmas.

- The exchange of gases between the blood and the air takes place in the
 - trachea.
 - diaphragm.
 - bronchi.
 - alveoli.
- Which of the following diseases causes less oxygen to be taken into the body from the air?
 - emphysema
 - stroke
 - hypertension
 - atherosclerosis

Complete the following sentences so that your answers clearly explain the key term.

- Blood pressure is exerted by the blood on the walls of blood vessels as a result of _____.
- The protein **hemoglobin** that is present in red blood cells enables the blood to carry oxygen because _____.
- Air comes into the lungs as a result of the actions of the **diaphragm** and chest muscles, which _____.
- Fluid that is carried by the lymphatic system is called **lymph**, which consists of _____.
- A **heart attack** can result in the death of some heart muscle cells because _____.

Writing in Science

Letter Write a letter to a friend describing what you do to stay active. For example, do you participate in team sports, jog, or take long walks with your dog? Include in your letter additional ways you can be even more active.



Target Reading Skill

Sequence Check students' flowcharts to make sure that the correct structures are named and that steps are in the correct sequence.

Reviewing Key Terms

- a
- a
- b
- d
- a
- the force with which the ventricles contract
- hemoglobin binds chemically to oxygen molecules
- make the chest cavity larger
- water, dissolved minerals, and some white blood cells
- the cells do not receive sufficient blood and oxygen

Writing in Science

E-LA: Writing 7.2.0

Writing Mode Descriptive

Scoring Rubric

- Includes a description of activities, using specific examples as applicable; describes several sensible ideas for increasing activity in safe and enjoyable settings; takes the form of a friendly letter
- Includes ideas for several reasonable activities, but does not take letter form
- Includes only one or two ideas for activities, and does not take letter form
- Is in letter form, but fails to include a description of any reasonable activities

Video Assessment

Circulation

Show the Video Assessment to review chapter content and as a prompt for the writing assignment. Discussion questions: **What are the two paths of the circulatory system?** (*Pulmonary circulation and systemic circulation*) **How does an athlete's heart differ from the heart of a non-athlete?** (*An athlete's heart is stronger and it pumps more efficiently than that of a non-athlete.*)

Checking Concepts

11. The left ventricle contracts with more force than the right ventricle. The left ventricle must pump blood throughout the entire body, while the right ventricle pumps blood only to the lungs.

12. The cell will pass through branching arteries into a capillary in your leg and then into a vein. A vein will then carry the cell to the right atrium of the heart.

13. Capillaries have thin walls, allowing substances to pass through easily.

14. Breathing consists of taking air into the body and removing it from the body. Respiration is the series of chemical reactions in cells in which glucose and oxygen react to release energy.

15. Because there are an enormous number of alveoli, together they have an extremely large surface area.

16. During a heart attack, cells die because they do not receive enough oxygen. Heart muscle may be damaged and weakened and no longer able to pump enough blood to the body.

Thinking Critically

17. Oxygen-poor blood from the right ventricle could flow to the left ventricle and be pumped to the rest of the body, so cells would not get enough oxygen.

18. The diagram shows inhalation or breathing. When the diaphragm moves downward, air pressure in the lungs decreases, causing air to rush in.

19. Excess mucus can block air passages, reducing the amount of air that can reach the lungs. This makes breathing difficult.

20. Students' judgments will vary. Check for supported arguments. For example: Drugstores are places where people can buy products to make them well. Therefore, drugstores should not carry tobacco products, which can damage health.

Math Practice

21. 120 beats per minute (30×4)

22. $2 \text{ cm} \times 2 \text{ cm} = 4 \text{ cm}^2$; $4 \text{ cm}^2 \times 6 \text{ sides} = 24 \text{ cm}^2$. $1 \text{ cm} \times 1 \text{ cm} = 1 \text{ cm}^2$; $1 \text{ cm}^2 \times 6 \text{ sides} = 6 \text{ cm}^2$ per cube; $8 \times 6 \text{ cm}^2 = 48 \text{ cm}^2$. The eight cubes that are each 1 cm on a side have greater total surface area.

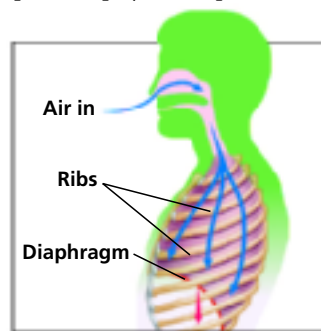
Review and Assessment

Checking Concepts

- 11.** Contrast the forces with which the right and left ventricles contract. How does this relate to each ventricle's function?
- 12.** A red blood cell is moving through an artery in your leg. Describe the path that the blood cell will follow back to your heart. Identify the chamber of the heart to which it will return.
- 13.** How is a capillary's structure adapted to its function?
- 14.** Explain the difference between breathing and respiration.
- 15.** Explain how the alveoli provide a large surface area for gas exchange in the lungs.
- 16.** How does a heart attack affect the body?

Thinking Critically

- 17. Predicting** Some babies are born with an opening between the left and right ventricles of the heart. How would this heart defect affect the ability of the cardiovascular system to deliver oxygen to body cells?
- 18. Making Judgments** What process is shown in the diagram below? What role do changes in air pressure play in this process?



- 19. Applying Concepts** Describe how the buildup of mucus in air passages affects breathing.
- 20. Making Judgments** Do you think that drugstores, which sell medicines, should also sell cigarettes and other tobacco products? Why or why not?

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Math Practice

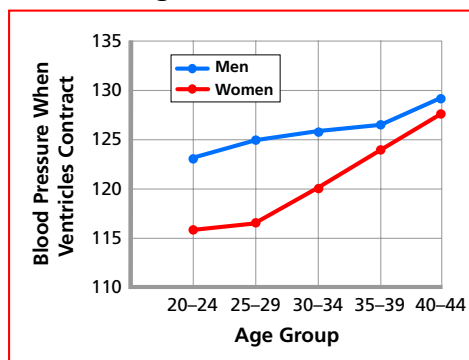
- 21. Calculating a Rate** The veterinarian listens to your cat's heart and counts 30 beats in 15 seconds. What is your cat's heart rate?
- 22. Surface Area** Which has a greater surface area, a cube that is $2 \text{ cm} \times 2 \text{ cm}$ on a side, or eight cubes that are each $1 \text{ cm} \times 1 \text{ cm}$ on a side? Show your work.

Applying Skills

Use the graph to answer Questions 23–25.

The graph below shows how average blood pressure changes as men and women grow older.

Changes in Blood Pressure



- 23. Interpreting Data** At age 20, who is likely to have higher blood pressure—men or women?
- 24. Drawing Conclusions** In general, what happens to blood pressure as people age?
- 25. Predicting** Do you think that there is some age at which both men and women have about the same blood pressure? Use the graph lines to explain your prediction.

Standards Investigation

Performance Assessment You should now be ready to present your display. Make sure it is clear and accurate, and be ready to answer questions from classmates.

23. Men

24. Both lines show that, on average, people's blood pressure increases as they age.

25. Sample answer: Yes. The two lines seem to be converging and will probably intersect at some age above 45.

Teachers can monitor student progress and supply remediation when necessary.

Choose the letter of the best answer.

- The most important function of the cardiovascular system is to
A transport needed materials to body cells and remove wastes.
B provide structural support for the lungs.
C generate blood pressure so the arteries and veins do not collapse.
D produce blood and lymph.
S 7.5.a
- The correct sequence of organs through which air travels when it is breathed into the body is
A pharynx, nose, trachea, bronchi.
B nose, trachea, pharynx, bronchi.
C nose, pharynx, bronchi, trachea.
D nose, pharynx, trachea, bronchi.
S 7.5.a
- When valves in the heart or blood vessels fail to function,
A the pumping of blood stops.
B a backflow of blood occurs.
C the heart stops.
D the blood pressure decreases.
S 7.5.b
- Blood pressure results from the
A contraction of the diaphragm.
B exchange of gases between the blood and body cells.
C build up of fatty materials in artery walls.
D contraction of the ventricles in the heart that forces blood into blood vessels.
S 7.6.j
- Which of the following conditions may result from insufficient gas exchange in the lungs?
A suffocation
B heart attack
C stroke
D atherosclerosis
S 7.5.b
- Which of the following pairs of structures work together to control inhaling and exhaling?
A lungs and rib muscles
B diaphragm and rib muscles
C diaphragm and bronchi
D trachea and lungs
S 7.5.a

Use the table below and your knowledge of science to answer Questions 7 and 8.

Blood Types		
Blood Type	Marker Molecules	Clumping Proteins
A	A	anti-B
B	B	anti-A
AB	A and B	none
O	none	anti-A and anti-B

- A person who has type O blood can safely receive blood from a person with
A type O blood.
B type A blood.
C type AB blood.
D type B blood.
S 7.5.b
- A person who has type O blood can safely donate blood to a person with
A type AB blood.
B type O blood.
C types A, B, AB, or O blood.
D type A or type B blood.
S 7.5.b

Apply the BIG Idea

- The delivery of oxygen to body cells and the removal of carbon dioxide from body cells depend on the functions of both the circulatory system and the respiratory system. In a paragraph, explain how functions in both of these systems are affected when gas exchange in the lungs is reduced. Give specific details in describing changes that may occur.
S 7.5.b

Standards Practice

- A; **S 7.5.a**
- D; **S 7.5.a**
- B; **S 7.5.b**
- D; **S 7.6.j**
- A; **S 7.5.b**
- B; **S 7.5.a**
- A; **S 7.5.b**
- C; **S 7.5.b**

Apply the BIG Idea

- When gas exchange in the lungs is reduced, less oxygen goes into the bloodstream and less carbon dioxide leaves the bloodstream. The person will breathe faster and harder to try to move more air in and out of the lungs. The heart will pump faster and harder to move blood throughout the body to deliver oxygen to cells. **S 7.5.b**

Lab zone Standards Investigation

S 7.5.a, 7.5.b

Performance Assessment Presentations should include a clear explanation of how the student has chosen to represent the process in his or her display. Encourage other students to ask questions about each model as it is presented.

Encourage students to identify one aspect of a particular display that helped them understand the concept. Some students may find that they learned more by making their own displays; others may find that they learned more by looking at other displays.

Teaching Resources

Laboratory Manual TE

- Standards Investigation Scoring Rubric

The Standards Investigation Scoring Rubric will help you evaluate students' work. If you share the rubric in advance, students will know what is expected of them.