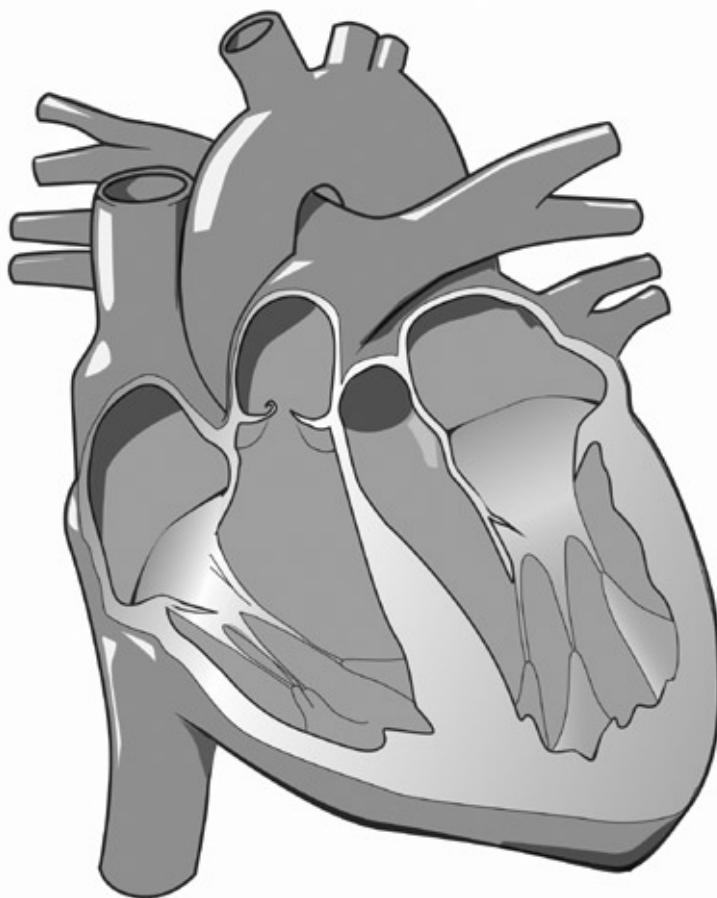


Healthy Circulatory and Respiratory Systems

Teacher's Guide Middle School



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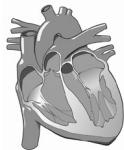


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A Message from our Company...

Dear Educator:

Thank you for your interest in the educational videos produced by the Visual Learning Company. We are a Vermont-based, family owned and operated business specializing in the production of quality educational science videos and materials.

We have a long family tradition of education. Our grandmothers graduated from normal school in the 1920's to become teachers. Brian's mother was an elementary teacher and guidance counselor, and his father was a high school teacher and superintendent. This family tradition inspired Brian to become a science teacher, and to earn a Ph.D. in education, and led Stephanie to work on science educational programs at NASA.

In developing this video, accompanying teacher's guide, and student activities, our goal is to provide educators with the highest quality materials, thus enabling students to be successful. In this era of more demanding standards and assessment requirements, supplementary materials need to be curricular and standards based - this is what we do!

Our videos and accompanying materials focus on the key concepts and vocabulary required by national and state standards and goals. It is our mission to help students meet these goals and standards, while experiencing the joy and thrill of science.

Sincerely,

Brian and Stephanie Jerome



National Standards Correlations

National Science Education Standards

(Content standards: 5-8, National Academy of Sciences)

Life Science (Content Standard C - Structure and Function in Living Systems)

As a result of their activities in grades 5-8, all students should develop an understanding that:

- The human organism has systems for digestion, respiration, reproduction, circulation, excretion, movement, control, and coordination, and for protection from disease. These systems interact with one another.

Science in Personal and Social Perspectives (Content Standard F - Personal Health)

- Regular exercise is important to the maintenance and improvement of health. The benefits of physical fitness include maintaining healthy weight, having energy and strength for routine activities, good muscle tone, bone strength, strong heart/lung systems, and improved mental health. Personal exercise, especially developing cardiovascular endurance, is the foundation of physical fitness.

Benchmarks for Science Literacy

(Project 2061 – AAAS)

The Human Organism - Basic Functions (6C)

By the end of 5th grade, students should know that:

- By breathing, people take in the oxygen they need to live.

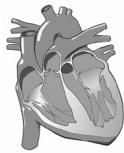
By the end of 8th grade, students should know that:

- To burn food for the release of energy stored in it, oxygen must be supplied to cells, and carbon dioxide removed. Lungs take in oxygen for the combustion of food and they eliminate the carbon dioxide produced. The urinary system disposes of dissolved waste molecules, the intestinal tract removes solid wastes, and the skin and lungs rid the body of heat energy. The circulatory system moves all these substances to or from cells where they are needed or produced, responding to changing demands.

The Human Organism - Physical Health (6E)

By the end of the 8th grade, students should know that:

- Toxic substances, some dietary habits, and personal behavior may be bad for one's health. Some effects show up right away, others may not show up for many years. Avoiding toxic substances, such as tobacco, and changing dietary habits to reduce the intake of such things as animal fat increases the chances of living longer.



Student Learning Objectives

Upon viewing the video and completing the enclosed student activities, students will be able to do the following:

- Describe the basic functions of the circulatory system.
- Explain the function of some of the major components of the circulatory system including the heart, blood, veins, arteries, and capillaries.
- Accurately take their own pulse rate. Describe what causes a pulse.
- Identify and describe the function of a stethoscope and a sphygmomanometer.
- Describe what high blood pressure (hypertension) is, and explain why it is a concern.
- Understand how heart attacks occur, and describe some of the factors which may contribute to heart attacks.
- Explain how a high fat diet, obesity, and smoking increases the probability of a heart attack.
- Cite the basic function of the respiratory system.
- List some of the problems posed to the respiratory system by smoking, emphysema, the common cold, and asthma.
- Describe the importance of eating a well-balanced diet, regular exercise, quitting smoking, and having a regular physical examination in maintaining healthy circulatory and respiratory systems.



Assessment

Preliminary Assessment:

The Preliminary Assessment, provided in the Student Masters section, is an assessment tool designed to gain an understanding of students' pre-existing knowledge. It can also be used as a benchmark upon which to assess student progress based on the objectives stated on the previous pages.

Video Review:

The Video Review, provided in the Student Masters section, can be used as an assessment tool or as a student activity. There are two main parts. The first part contains questions that can be answered during the video. The second series of ten questions consists of a video quiz to be answered at the conclusion of the video.

Post Assessment:

The Post Assessment, provided in the Student Masters section, can be utilized as an assessment tool following completion of the video and student activities. The results of the Post Assessment can be compared against the results of the Preliminary Assessment to evaluate student progress.



Introducing the Video

Before showing the video program to your students, demonstrate how to take your pulse rate. Have them do the same, and then write their pulse rate on a piece of paper. Next, demonstrate how to calculate your respiration rate. Have students do the same, and then record their rate of respiration on the same piece of paper. Ask students to compare their pulse rates and respiration rates to those of other students. Ask them if everyone's rates are identical. Discuss why people have different pulse rates and respiration rates.

Next, ask students if they have ever noticed that certain activities such as exercise or being frightened cause their pulse and respiration rates to increase. Discuss why these factors cause rates to increase. In explaining this use the terms: heart, blood vessels, muscles, lungs, and oxygen. Finally, ask students if they are familiar with any problems which may arise with these structures in the body. Tell students to pay close attention to the program to learn more about the circulatory and respiratory systems.

Video Viewing Suggestions

The student Master "Video Review" is provided for distribution to students. You may choose to have your students complete this Master while viewing the program or to do so upon its conclusion.

The program is approximately twenty minutes in length and includes a ten question video quiz. Answers are not provided to the Video Quiz on the video, but are included in this teacher's guide. You may choose to grade student quizzes as an assessment tool or to review the answers in class.

The video is content-rich with numerous vocabulary words. For this reason you may want to periodically stop the video to review and discuss new terminology and concepts.



Video Script: Healthy Circulatory and Respiratory Systems

1. Have you ever exercised so hard, that when you stop you can actually feel your heart beating?
2. Maybe you have found it difficult to catch your breath while climbing up a hill.
3. Perhaps you have accidentally cut yourself and started to bleed.
4. These things are all related to two very important systems in the human body – the circulatory system and the respiratory system.
5. What are some of the basic functions and structures of these two systems?
6. What problems do people sometimes have with their circulatory and respiratory systems?
7. What can we do to keep them healthy?
8. During the next few minutes we are going to explore these questions and others...
9. ...as we investigate our circulatory and respiratory systems.

10. Graphic Transition – Circulatory System Fundamentals

11. This train is transporting cargo from one place to another.
12. The circulatory system is like a train in that it picks up things in one place and transports them to another place.
13. The heart, blood, and blood vessels are the major components of the circulatory system.
14. Every minute of our lives blood continually moves through our body in tubes called blood vessels. It is a process called “circulation.”
15. “Blood vessels” vary in size and function.
16. You can think of blood vessels like the pipes in your home, with some carrying water toward your sink and toilet, and other pipes,...
17. ...carrying away wastes.
18. The circulatory system also transports fresh oxygen to body cells.
19. **You Decide!** Where do we get that oxygen?
20. We breathe in oxygen from the air around us. Through a series of processes oxygen rich blood is circulated throughout the body.
21. Waste products produced by cells such as carbon dioxide are also carried away by the circulatory system.
22. A couple of the many important functions performed by the circulatory system include transportation of hormones and materials to fight germs.
23. **Graphic Transition – Components of the Circulatory System**
24. We just mentioned that the major components of the circulatory system include blood, heart, and blood vessels.



Script (cont.)

25. Let's take a quick look at each.
26. Your body has about five liters of blood which is equivalent to this amount of water.
27. About 55% of blood is a liquid called plasma which is mainly made of water.
28. Plasma carries hormones, nutrients, and waste products in the blood.
29. Proteins and materials used to clot blood, and to fight disease are also in blood plasma.
30. Did you know that within the liquid part of the blood there are small solids?
31. Platelets, which help clot blood, are solids as are different kinds of cells.
32. One kind of cell, red blood cells, have the primary job of carrying oxygen throughout the body.
33. Much larger white blood cells help fight infection and foreign invaders.
34. Take two fingers and place them on your opposite wrist like this.
35. The slight movement you feel is blood moving through a blood vessel to your hand.
36. Blood vessels are small tubes which form a complex network hundreds of kilometers long in the body.
37. Blood vessels called "arteries" carry oxygen-rich blood away from the heart.
38. And, blood vessels called "veins" carry oxygen-depleted blood back to the heart.
39. Tiny blood vessels referred to as "capillaries", are the sites where food, oxygen, and waste materials are exchanged between blood and body cells.
40. **You Compute!** Count the number of times you hear the heart pump during the next 10 seconds. Start now!
41. The heart pumped 12 times. If you multiply 12×6 you get the number of times the heart beats in one minute – 72 times. This is referred to as a person's heart rate or pulse rate.
42. Your heart is continually beating; pumping blood throughout the body, and into the lungs where blood picks up oxygen and drops off carbon dioxide.
43. The heart is an amazing muscle. If you measure the amount of blood it pumps every day, it could fill this entire train car.
44. **Graphic Transition – Monitoring the Circulatory System**
45. When you visit the doctor, one of the first things he/she does is to check your circulatory system.
46. Quite often the nurse, doctor, or physician's assistant counts your pulse rate.
47. An average pulse rate is generally between 60 and 80 beats per minute.
48. This instrument called a "stethoscope" helps the examiner listen to your heart to make sure it is working properly.



Script (cont.)

49. You are probably also familiar with this instrument called a “sphygmomanometer”, which is used to measure blood pressure.
 50. Blood pressure is the force placed on the walls of blood vessels by flowing blood.
 51. Blood pressure is generally measured using two numbers.
 52. The higher number is a measure of the force at its greatest, occurring at each beat.
 53. The lower number measures the least amount of force when the heart is between beats.
 54. We will talk more about blood pressure in a minute.
 55. It is important that your circulatory system be checked on a regular basis during annual physicals, at a clinic, or at a doctor’s office.
- 56. Graphic Transition – Problems of the Circulatory System**
57. If you are lucky, you don’t have any problems with your circulatory system.
 58. But, you may know a family member or friend who has a problem such as high blood pressure or anemia.
 59. High blood pressure, also called “hypertension”, is a problem affecting millions of people.
 60. It can add stress to the heart, increasing the chances of stroke, heart attacks, and other health problems.
 61. People with blood pressure greater than 140 for the upper number and greater than 90 for the lower number are considered to have high blood pressure.
 62. People with high blood pressure are encouraged to change certain aspects of their lifestyle such as losing weight, exercising, quitting smoking, and altering their diet. In some cases medications are prescribed.
 63. There are many things which can hinder the heart’s ability to work properly.
 64. The most common cause of heart damage results from heart attacks. “Heart attacks” are frequently caused by atherosclerosis. “Atherosclerosis” is a condition in which fatty substances are deposited on the inner walls of arteries.
 65. When coronary arteries, those that supply blood to the heart, become clogged with fats it is more difficult for blood to nourish heart muscle.
 66. When blood flow gets cut off or is greatly reduced to the heart muscle, a heart attack may occur, and the heart can be damaged.
 67. One of the major contributing factors leading to atherosclerosis is fats such as cholesterol which line arteries.
 68. Thus, eating a low fat diet, limiting dairy and animal fats, is suggested for adults and even adolescents.
 69. “Anemia” is another problem that can affect the circulatory system.
 70. A person who is anemic often feels run down and tired.



Script (cont.)

71. This condition is the result of having too few red blood cells in the blood, low iron levels, or low levels of hemoglobin.
72. Specific vitamin supplements or other medications are often prescribed to treat anemia.
- 73. Graphic Transition – The Respiratory System**
74. Breathing is an essential activity of living things.
75. Humans, for example, breathe about 18 times per minute their entire lives.
- 76. You Decide! Why do we breathe?**
77. We breathe because the body needs to exchange gases with the environment to carry out important body processes.
78. When we inhale the body takes in oxygen.
79. And when we exhale, or breathe out, the body gives off a waste product called carbon dioxide.
80. The major site of gas exchange occurs in the lungs. We have two lungs.
81. The lungs, located in the chest, are sponge-like organs in which oxygen and carbon dioxide are passed between the blood and the environment.
82. The heart plays a key role in pumping oxygen depleted blood to the lungs where it picks up oxygen.
83. And, in turn oxygen rich blood is sent back to the heart where it is then pumped throughout the body.
- 84. Graphic Transition – Problems of the Respiratory System**
85. If you smoke, nearly every doctor and health professional would tell you to stop smoking right away. Why?
86. Smoking is the number one cause of lung cancer. It is also a major cause of another respiratory problem called emphysema.
87. Lung cancer is a very serious disease in which cancer cells grow out of control, destroying tissue, which can eventually lead to death.
88. “Emphysema” is another severe lung disease caused by breathing in smoke or dirty air. These harmful substances destroy lung tissue making it very difficult for air to pass in and out of the lungs.
89. You may know someone who has a respiratory affliction called asthma.
90. “Asthma” is an allergic and an inflammatory response in which airways constrict, making it difficult to breathe.
91. Pollen, dust, smoke, strenuous exercise, and even cold air can trigger an asthma attack.
92. Several different medications can be prescribed for those suffering from asthma.



Script (cont.)

93. By far the most widely occurring respiratory problem is caused by the common cold.

94. Typically colds are caused by viruses which infect the respiratory system and cause coughing and moderate chest pain. Most people recover from viral respiratory tract infections within several days.

95. Graphic Transition – Maintaining Healthy Circulatory and Respiratory Systems

96. Maintaining healthy circulatory and respiratory systems are important to leading an active, exciting, healthy, and long life.

97. There are several things you can do to help these systems.

98. First, if you smoke, quit now. As soon as people stop smoking the risk of various types of cancer, as well as heart disease, and high blood pressure drops dramatically.

99. Eat a healthy, well-balanced diet with lots of fruits and vegetables.

100. Avoid fatty foods such as fatty meats and high-fat dairy products.

101. Don't forget to drink at least eight 8-ounce glasses of water everyday.

102. Maintain a healthy body weight. If your doctor tells you you are overweight or underweight, make adjustments to your diet accordingly.

103. It is also important to exercise regularly.

104. Adolescents should never take substances that harm their bodies such as alcohol, illegal drugs, and tobacco.

105. To help prevent respiratory infections and other illnesses it is important to wash your hands throughout the day.

106. Finally, it is very important to have a physical examination from a doctor at least once a year.

107. While doing all these things does not guarantee you will have healthy circulatory and respiratory systems, it greatly increases your odds.

108. Graphic Transition – Summing Up

109. During the past few minutes we have explored some of the fascinating aspects of healthy circulatory and respiratory systems.

110. First the basic functions and structures of the circulatory system were discussed.

111. Some of the common ways the circulatory system is monitored were reviewed.

112. And some of the more common problems which may occur in this system were briefly addressed.

113. Next, the main structures and functions of the respiratory system were highlighted.

114. As were many of the more common respiratory system problems.



Script (cont.)

115. Finally, several of the things people should do to maintain healthy circulatory and respiratory systems were suggested including eating a well balanced diet, ...
116. ...maintaining a healthy body weight, regularly exercising, avoiding harmful substances, and obtaining regular physical examinations.
117. So, the next time you feel your heart beating...
118. ...or try to catch your breath, think about some of the things we have just discussed.
119. You might just think about healthy circulatory and respiratory systems a little differently.

120. Graphic Transition – Video Assessment

Fill in the correct answer to complete the question. Good luck and let's get started.

1. The circulatory system ____ materials throughout the body.
2. Blood ____ are tubes which carry blood.
3. Tiny blood vessels are called ____.
4. Blood ____ is the force on the walls of the arteries.
5. High blood pressure may add stress to the ____.
6. When blood flow to heart muscle is greatly reduced, a heart ____ may occur.
7. The major site of gas exchange occurs in the ____.
8. Smoking is the major cause of lung ____.
9. ____ is an allergic response in which the airways become constricted.
10. It is important to have a physical ____ each year.

Answers can be found on page 17



Student Assessments and Activities

Assessment Masters:

- Preliminary Assessment
- Video Review
- Post Assessment

Student Activity Masters:

- Lung Simulation
- The Cardiopulmonary System
- Calculating Pulse and Respiration Rates
- Vocabulary of *Healthy Circulatory and Respiratory Systems*



Answers to Student Assessments

Preliminary Assessment (pgs. 20-21)

1. circulation
2. vessels
3. heart
4. pulse
5. pressure
6. attack
7. lungs
8. smoking
9. cold
10. examination
11. true
12. false
13. true
14. false
15. false
16. true
17. true
18. true
19. false
20. false

Video Review (p. 22)

1. We breathe in oxygen from the air around us. Through a series of processes oxygen rich blood is circulated throughout the body.
2. The heart pumped 12 times. If you multiply 12×6 , you get the number of times the heart beats in one minute - 72 times. This would be the person's heart rate or pulse rate.
3. We breathe because the body needs to exchange gases with the environment to carry out important body processes.

Video Quiz (p. 22)

1. transports
2. vessels
3. capillaries
4. pressure
5. heart
6. attack
7. lungs
8. cancer
9. asthma
10. examination

Post Assessment (pgs. 23-24)

1. attack
2. smoking
3. vessels
4. cold
5. circulation
6. lungs
7. heart
8. pressure
9. examination
10. pulse
11. true
12. true
13. false
14. false
15. false
16. true
17. true
18. false
19. true
20. false



Answers to Student Activities

Lung Simulation (pgs. 25-26)

1. Inhalation is the process of breathing in, and exhalation is the process of breathing out. In inhalation fresh oxygen enters the lungs, and in exhalation waste gases leave the body.
2. Air enters the lung when the chest cavity expands as a result of the chest going out and the diaphragm lowering. This creates lower pressure in the chest cavity than outside the body. Air then moves from higher pressure outside the body into the lungs. When the chest cavity decreases in size, pressure in the lungs increases as compared to outside the body. This causes air to leave the lungs in the process of exhalation.
3. When you pulled down the small balloon filled with air, this caused the volume to increase inside the bottle, and lowered the pressure inside the bottle.
4. The small balloon represents the lungs, and the large balloon represents the diaphragm.
5. The bottle represents the chest cavity. The diaphragm is represented by the large balloon on the bottom. It has the ability to move, and this causes the size of the chest cavity to fluctuate. When this occurs it increases or decreases pressure in the bottle, and this causes the small balloon to "inhale" or "exhale".

The Cardiopulmonary System (p. 27)

- | | |
|--------------------|-----------------------|
| A. trachea | 1. aorta |
| B. bronchi | 2. pulmonary arteries |
| C. bronchial tubes | 3. pulmonary veins |
| D. lung | 4. heart |

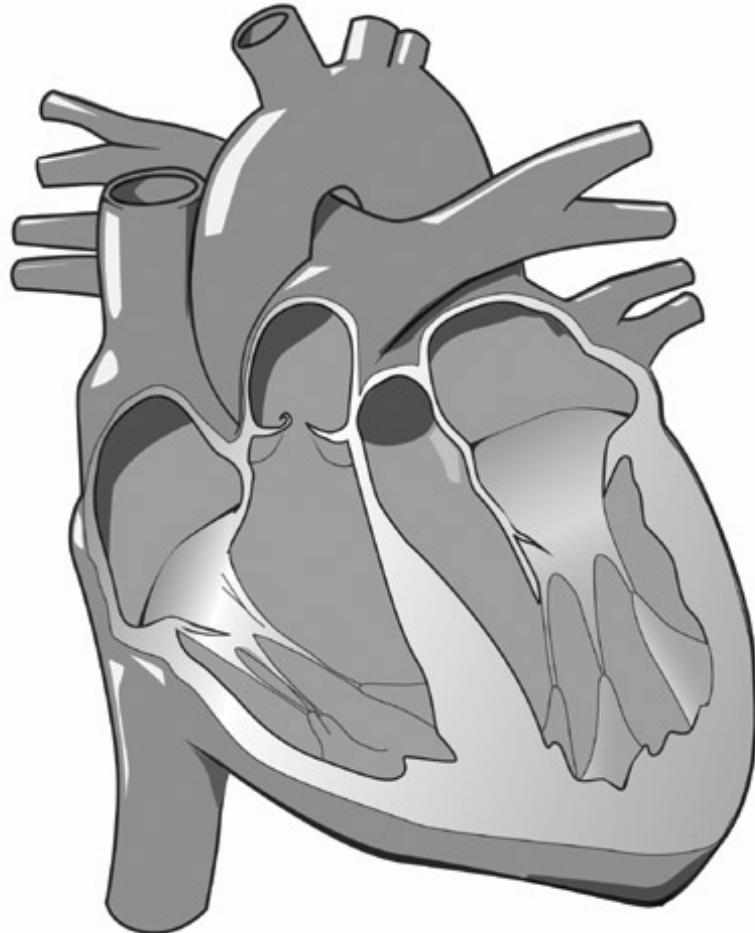
Vocabulary of Healthy Circulatory and Respiratory Systems (p. 30)

1. f - circulation
2. i - platelets
3. a - arteries
4. g - stethoscope
5. b - hypertension
6. d - heart attack
7. j - anemia
8. e - asthma
9. c - smoking
10. h - physical examination

Calculating Pulse and Respiration Rates (pgs. 28-29)

1. Pulse is the rhythmic flow of blood in blood vessels caused by the heart pumping blood.
2. As exercise increased, the pulse rate increased.
3. As exercise increases, both the pulse rate and respiration rate increases.
4. This occurs because during exercise muscle requires more oxygen. The rate of respiration increases to provide more oxygen, and the pulse rate increases so that more oxygen in the blood can be delivered to muscles.
5. If you exercised for five minutes, the pulse and respiration rates would dramatically increase.

Assessment and Student Activity Masters



Preliminary Assessment

Directions: Fill in the blank with the correct word. A list of possible answers is provided at the bottom of the page.

1. _____ is the process of the blood moving materials throughout the body.
2. Tubes responsible for carrying blood throughout the body are called blood _____.
3. The _____ is responsible for pumping blood throughout the body.
4. The _____ rate is the number of times the heart pumps blood in one minute.
5. Hypertension occurs when a person's blood _____ is too high.
6. A heart _____ may occur when coronary arteries which supply blood to the heart become blocked.
7. The _____ supply the blood with oxygen.
8. _____ is the number one cause of lung cancer.
9. The most prevalent respiratory problem is the common _____.
10. It is very important to have a physical _____ once a year.

smoking	heart
vessels	cold
examination	pressure
lungs	pulse
circulation	attack

Preliminary Assessment

Directions: Decide whether the statement is true (T) or false (F).

- | | | |
|---|---|---|
| 11. The heart, blood, and blood vessels are the major components of the circulatory system. | T | F |
| 12. All blood vessels are all the same size. | T | F |
| 13. The blood transports many things including gases, cells, and materials to fight germs. | T | F |
| 14. White blood cells are responsible for carrying oxygen. | T | F |
| 15. A sphygmomanometer is an instrument used to listen to the heart. | T | F |
| 16. High blood pressure may increase the chances of a person having a heart attack or a stroke. | T | F |
| 17. Atherosclerosis is a condition in which fatty substances are deposited on the inner walls of arteries. | T | F |
| 18. In the process of breathing the body breathes in oxygen gas and breathes out waste gases and water vapor. | T | F |
| 19. Smoking is not believed to be linked to lung cancer. | T | F |
| 20. You should only go to the doctor when you are sick. | T | F |

Video Review

Directions: During the course of the program, answer the questions as they are presented in the video. At the end of the video, answer the Video Quiz questions.

You Decide!

1. Where do we get oxygen?

You Compute!

2. Count the number of times you hear the heart pump during the next 10 seconds.
Start now!

You Decide!

3. Why do we breathe?

Video Quiz: Fill in the correct word to complete the sentence.

1. The circulatory system _____ materials throughout the body.
2. Blood _____ are tubes which carry blood.
3. Tiny blood vessels are called _____.
4. Blood _____ is the force on the walls of the arteries.
5. High blood pressure may add stress to the _____.
6. When blood flow to heart muscle is greatly reduced, a heart _____ may occur.
7. The major site of gas exchange occurs in the _____.
8. Smoking is the major cause of lung _____.
9. _____ is an allergic response in which the airways become constricted.
10. It is important to have a physical _____ each year.

Post Assessment

Directions: Fill in the blank with the correct word. A list of possible answers is provided at the bottom of the page.

1. A heart _____ may occur when coronary arteries which supply blood to the heart become blocked.
2. _____ is the number one cause of lung cancer.
3. Tubes responsible for carrying blood throughout the body are called blood _____.
4. The most prevalent respiratory problem is the common _____.
5. _____ is the process of the blood moving materials throughout the body.
6. The _____ supply the blood with oxygen.
7. The _____ is responsible for pumping blood throughout the body.
8. Hypertension occurs when a person's blood _____ is too high.
9. It is very important to have a physical _____ once a year.
10. The _____ rate is the number of times the heart pumps blood in one minute.

circulation	smoking
pulse	heart
vessels	attack
lungs	pressure
examination	cold

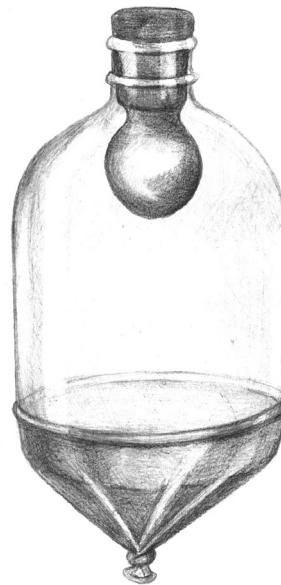
Post Assessment

Directions: Decide whether the statement is true (T) or false (F).

- | | | |
|---|---|---|
| 11. The blood transports many things including gases, cells, and materials to fight germs. | T | F |
| 12. High blood pressure may increase the chances of a person having a heart attack or a stroke. | T | F |
| 13. Smoking is not believed to be linked to lung cancer. | T | F |
| 14. All blood vessels are all the same size. | T | F |
| 15. A sphygmomanometer is an instrument used to listen to the heart. | T | F |
| 16. In the process of breathing the body breathes in oxygen gas and breathes out waste gases and water vapor. | T | F |
| 17. The heart, blood, and blood vessels are the major components of the circulatory system. | T | F |
| 18. White blood cells are responsible for carrying oxygen. | T | F |
| 19. Atherosclerosis is a condition in which fatty substances are deposited on the inner walls of arteries. | T | F |
| 20. You should only go to the doctor when you are sick. | T | F |

Lung Simulation

Background: Take a deep breath. Feel the air go into your nose and down your windpipe. How did this air enter your body? Did you move your lungs to force air into them? Of course not. Air enters your lungs when your chest expands and your diaphragm lowers (the diaphragm is a muscle that forms the floor of the chest cavity). As the ribs are pulled up and out, and the diaphragm is pulled downward, the chest cavity expands. This process reduces the pressure within the chest cavity. This allows air from the outside the body to rush into the lungs. This process is called **inhalation**. When the chest and the diaphragm relax, the chest cavity decreases in size. This causes pressure in the lungs to become greater than the air outside the body. Air then leaves the lungs. This process is referred to as **exhalation**.



Materials: plastic soda bottle (200ml to 500ml), small balloon, large balloon, rubber stopper, safety goggles, and scissors

Activity:

1. Obtain the materials listed above from your instructor.
2. Put safety goggles securely over your eyes.
3. Place the soda bottle on its side. Carefully insert one point of the scissors through the side of the bottle about one to two centimeters above the bottom.
4. Cut off the bottom of the bottle by evenly cutting around the outside of the bottle.
5. Stretch out the small balloon, and blow it up numerous times. Stretch the lip of the balloon over the bottom of the rubber stopper.
6. Carefully insert the bottom of the balloon through the mouth of the bottle and press the stopper tightly into the bottle. The stopper should snugly hold the balloon in place.
7. Next, cut about 1 cm off the rounded bottom of the large balloon.
8. Tie the neck of the balloon shut with a knot.
9. Stretch the cut end of the balloon over the bottom of the bottle. If you have a hard time getting the balloon to stay on the bottle, use duct tape to secure it.
10. Now you are ready to simulate the operation of a lung. While watching the small balloon, carefully pull down the knot of the large balloon. Watch what happens! Then press up on the knot of the large balloon. Observe the small balloon.

Lung Simulation cont.

Directions: Answer the questions below.

Questions:

1. Differentiate between inhalation and exhalation.
 2. Explain how and why air enters the lungs.
 3. Describe what happened to the small balloon when you pulled down on the large balloon. Why did this occur?
 4. What do the small balloon and the large balloon represent?
 5. Explain how the model you created simulates the respiratory system.

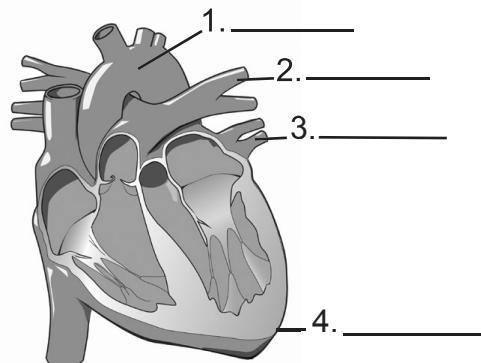
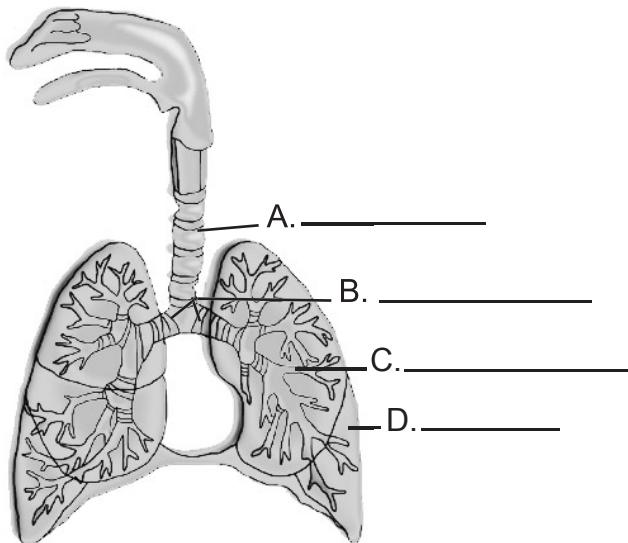
The Cardiopulmonary System

Background: Even though it is common to discuss the circulatory and respiratory systems separately, these two systems constantly work together. Because these two systems are so closely meshed together they are sometimes referred to as the cardiopulmonary system. “Cardio” refers to the heart, and “pulmonary” refers to the lungs. The lungs supply oxygen to the blood which in turn is pumped by the heart throughout the body. The blood then returns waste gases to the lungs which are exhaled. This is just one example illustrating how the circulatory and respiratory systems work together.

Directions: In this activity you will identify some of the major parts of the cardiopulmonary system, and state their function. Below is a list of parts. Match the correct part to the structure. Then, using your knowledge and other reference materials, state the function of the structure.

trachea
lung
bronchial tube
bronchi

heart
pulmonary veins
pulmonary arteries
aorta



Calculating Pulse and Respiration Rates

Background: Your heart is continually beating. The primary job of the heart is to pump blood throughout the body. It is an amazing muscle! If you were to measure the amount of blood the heart pumps everyday, it could fill an entire train car!

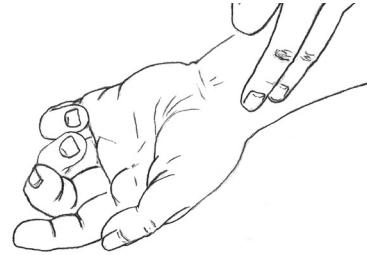
One of the first things a medical professional does when examining your body is to check your circulatory system. A nurse, doctor, or physician's assistant counts your pulse rate. The pulse rate is the number of times your heart beats per minute. Your pulse rate changes many times throughout the course of the day. Many factors influence your pulse rate including whether you are resting, exercising, even your mood. As you know, breathing is a very important process carried out by the body many times every minute of your life. Air is inhaled where lungs supply oxygen to the blood. In turn, waste products are exhaled. Your respiration rate also changes many times during the day.

In this activity you will explore some of the ways your pulse rate and respiration rate fluctuates as related to different types of activities.

Materials: stopwatch or watch with second-hand

Activity:

1. In this activity you will work in pairs. First you must learn how to take a pulse. Have your partner sit down and place one of their arms (palm side up) on the table. Take your middle and pointer fingers and place them lightly on the inside-top of your wrist. Adjust the position of your fingers until you feel your partner's pulse.
2. Once you have found your partner's pulse, have him/her start reading their stop watch at zero while you count the pulses. Do this for 60 seconds. Next, have your partner take your pulse for 60 seconds.
3. Record your resting pulse rate in the data table.
4. Next take your resting respiration rate. This is done by counting the number of times your heart beats in a 60 second time period.
5. Next, have your partner take his/her resting pulse rate and respiration rate.
6. Now stand up for one minute. After one minute, record your pulse rate for 60 seconds and respiration rate for 60 seconds. Write these in the data table. Have your partner do the same.



Calculating Pulse and Respiration Rates cont.

Activity cont.

7. Walk in place for one minute. Then take your pulse for 60 seconds. Record this in the data table. Have your partner do the same while you rest.
8. Once again, walk in place for one minute. This time record your respiration rate for 60 seconds. Then have your partner do the same.
9. Run in place for one minute. Then take your pulse for 60 seconds and record it in the data table. Have your partner do the same while you rest.
10. Once again run in place for one minute. Then take your respiration rate for 60 seconds, and record it in the data table. Have your partner do the same.

Data Table

	Pulse Rate (60 seconds)	Respiration Rate (60 seconds)
Resting		
Standing		
Walking		
Running		

Questions:

1. What causes a pulse?
2. How did your pulse rate change with exercise?
3. What is the relationship between pulse rate, respiration rate, and exercise?
4. Why does your pulse rate and respiration rate increase with exercise?
5. What do you think would happen to your pulse rate and respiration rate if you exercised for 5 minutes?

Vocabulary of Healthy Circulatory and Respiratory Systems

Directions: Unscramble the vocabulary words in the first column. Match the words to the definitions in the second column.

- | | |
|-------------------------------------|--|
| ____ 1. rlicuocntia _____ | a. blood vessels which carry oxygen-rich blood away from the heart. |
| ____ 2. elstptale _____ | b. term used to describe the condition of high blood pressure. |
| ____ 3. reisatre _____ | c. the number one cause of lung cancer. |
| ____ 4. hptesetooosc _____ | d. an event in which damage is done to heart muscle; often caused when coronary arteries become blocked by fatty substances. |
| ____ 5. ptsnenheyori _____ | e. an allergic and inflammatory response in which airways constrict. |
| ____ 6. threa ctkaat _____ | f. the process of blood moving materials throughout the body. |
| ____ 7. aaiegn _____ | g. an instrument used to listen to the heart or lungs. |
| ____ 8. htmsaa _____ | h. a regular annual check-up by a medical professional. |
| ____ 9. sgmoik _____ | i. solids in the blood responsible for aiding in blood clotting. |
| ____ 10. hsclyaip nxnoemtaaii _____ | j. condition is the result of having too few red blood cells, low iron levels, or low levels of hemoglobin. |