Chapter 1: Circulatory and Respiratory Systems Worksheets

Chapter Outline

1.1 Circulatory System
1.2 Blood
1.3 Respiratory System
1.4 References

Chapter 22: Circulatory and Respiratory Systems

- Lesson 22.1: Circulatory System
- Lesson 22.2: Blood
- Lesson 22.3: Respiratory System
Lesson 22.1: True or False

Name___________________ Class_______ Date_____

Write true if the statement is true or false if the statement is false.

______ 1. In adults, the normal mass of the heart is 100-200 grams.
______ 2. The right side of the heart collects oxygenated blood from the body.
______ 3. Valves in the heart maintain the flow of blood.
______ 4. Cardiac muscle is self-exciting.
______ 5. The heartbeat is made up of three parts.
______ 6. Arteries carry blood away from the heart.
______ 7. The aorta is the largest artery in the body.
______ 8. Capillaries are the smallest of the body’s blood vessels.
______ 9. The lymphatic system is often called the primary circulatory system.
______ 10. Atherosclerosis normally begins in adulthood.

Lesson 22.1: Critical Reading

Name___________________ Class_______ Date_____

Read this passage from the lesson and answer the questions that follow.

Homeostatic Imbalances of the Cardiovascular System

Cardiovascular disease (CVD) refers to any disease that affects the cardiovascular system, but it is usually used to refer to diseases related to atherosclerosis, which is a chronic inflammatory response in the walls of arteries that causes a swelling and buildup of materials called plaque. Plaque is made of cell debris, cholesterol, fatty acids, calcium, and fibrous connective tissue that build up around an area of inflammation. As a plaque grows it stiffens and narrows the artery, which reduces the flow of blood through the artery, shown in Figure 1.1.

Atherosclerosis

Atherosclerosis normally begins in later childhood, and is usually found in most major arteries. It does not usually have any early symptoms. Causes of atherosclerosis include a high-fat diet, high cholesterol, smoking, obesity, and diabetes. Atherosclerosis becomes a threat to health when the plaque buildup interferes with the blood circulation in the heart (coronary circulation) or the brain (cerebral circulation). A blockage in the coronary circulation, can lead to a heart attack, and blockage of the cerebral circulation (leading to, or within the brain) can lead to a stroke.

According to the American Heart Association, atherosclerosis is a leading cause of CVD.

Questions
1. Cardiovascular disease (CVD) is usually referred to diseases related to what?

2. What is plaque made up of?

3. Atherosclerosis is sometimes referred to as what?

4. What are the causes of atherosclerosis?

5. In what two organs can plaque buildup interfere with blood circulation?

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**Lesson 22.1: Multiple Choice**

Name____________________________ Class_______ Date ________

*Circle the letter of the correct choice.*

a. What does the cardiovascular system move to and from body cells?
   - a. nutrients
   - b. hormones
   - c. gases and wastes
d. all of the above

b. In adults, the normal mass of the heart is ________________.
   a. 50-100 grams (g)
   b. 100-150 g
   c. 200-250 g
   d. 250-350 g

c. One of the semilunar valves is the ________________.
   a. pulmonary
   b. tricuspid
   c. bicuspid
   d. mitral

d. Which of the following is the most critical nutrient carried by the blood?
   a. calcium
   b. oxygen
   c. iron
   d. none of the above

e. In the U.S. the healthy systolic pressure is ________________.
   a. less than 80 mm Hg
   b. less than 100 mm Hg
   c. less than 120 mm Hg
   d. less than 140 mm Hg

f. An example of a portal venous system is the blood vessel network between the digestive tract and the
   a. heart.
   b. liver.
   c. brain.
   d. none of the above

g. The lymphatic system
   a. removes excess fluids from body tissues.
   b. absorbs fats and transports them to the cardiovascular system.
   c. produces certain types of white blood cells.
   d. all of the above

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Lesson 22.1: Vocabulary

Name____________________________ Class_______ Date ________

Match the vocabulary term with the correct definition.

Term

___ 1. vein
___ 2. systole
___ 3. artery
___ 4. ventricles
___ 5. hypertension
6. diastole
7. coronary circulation
8. blood pressure
9. sphygmanometer
10. atrioventricular valves

Definition
a. Large, muscular vessels that carry blood away from the heart
b. Contraction of the heart chambers, which drives blood out of the chambers
c. Supplies the heart tissue with blood
d. Heart chambers which collect blood from the atria and pump it out of the heart
e. Vessel that carries blood toward the heart
f. The force exerted by circulating blood on the walls of blood vessels
g. Ensure blood flows from the atria to the ventricles
h. Measures arterial pressure
i. Period of time when the heart relaxes after contraction
j. Condition in which a person’s blood pressure is chronically high
Lesson 22.2: True or False

Name____________________________ Class_______ Date ________

Write true if the statement is true or false if the statement is false.

______ 1. Arterial blood carries oxygen and nutrients to all the body’s cells.
______ 2. Plasma acts as a buffer, maintaining pH near 7.4.
______ 3. Mature red blood cells have a nucleus.
______ 4. Platelets make up 50 percent of blood volume.
______ 5. The hemoglobin molecule is the major transporter of oxygen in mammals.
______ 6. Increasing blood flow to the surface causes cooler skin.
______ 7. Type O blood does not have an antigen.
______ 8. The Rhesus system is named after the Rhesus monkey.
______ 9. Those with type AB positive blood are called universal donors.
______ 10. Those with sickle cell disease are resistant to malaria.

Lesson 22.2: Critical Reading

Name____________________________ Class_______ Date ________

Read this passage from the lesson and answer the questions that follow.

Homeostatic Imbalances of the Blood

Problems can occur with red blood cells, white blood cells, platelets, and other components of the blood. Many blood disorders are genetic, they are inherited from a parent, some are a result of nutrient deficiency, while others are cancers of the blood.

Sickle-cell disease is a group of genetic disorders caused by abnormally shaped hemoglobin, called sickle hemoglobin. In many forms of the disease, the red blood cells change shape because the abnormal hemoglobin proteins stick to each other, causing the cell to get a rigid surface and sickle shape, shown in Figure 1.2. This process damages the membrane of the red blood cell, and can cause the cells to get stuck in blood vessels. This clotting causes oxygen starvation in tissues, which may cause organ damage such as stroke or heart attack. The disease is chronic and lifelong. Individuals are most often well, but their lives are punctuated by periodic painful attacks. Sickle-cell disease occurs more commonly in people (or their descendants) from parts of the world such as sub-Saharan Africa, where malaria is or was common. It also occurs in people of other ethnicities. As a result, those with sickle cell disease are resistant to malaria since the red blood cells are not favored by the malaria parasites. The mutated hemoglobin allele is recessive, meaning it must be inherited from each parent for the individual to have the disease.

Iron deficiency anemia is the most common type of anemia. It occurs when the dietary intake or absorption of
iron is less than what is needed by the body. As a result, hemoglobin, which contains iron, cannot be made. In the United States, 20 percent of all women of childbearing age have iron deficiency anemia, compared with only 2 percent of adult men. The principal cause of iron deficiency anemia in premenopausal women is blood lost during menstruation.

**Leukemia** is a cancer that originates in the bone marrow and is characterized by an abnormal production of white blood cells (rarely red blood cells) that are released into the bloodstream. **Lymphoma** is a cancer of the lymphatic system, which helps to filter blood. Lymphoma can be categorized as either Hodgkin’s lymphoma or non-Hodgkin’s lymphoma.

**Hemophilia** is the name of a group of hereditary genetic diseases that affect the body’s ability to control blood clotting. Hemophilia is characterized by a lack of clotting factors in the blood. Clotting factors are needed for a normal clotting process. When a blood vessel is injured, a temporary scab does form, but the missing coagulation factors prevent the formation of fibrin which is needed to maintain the blood clot. Therefore, a person who has hemophilia is initially able to make a clot to stop the bleeding, but because fibrin is not produced, the body is unable to maintain a clot for long. The risks of the re-bleeding of an injury and internal bleeding are increased in hemophilia, especially into muscles, joints, or bleeding into closed spaces.

**Haemochromatosis** is a hereditary disease that is characterized by a buildup of iron in the body. Iron accumulation can eventually cause end organ damage, most importantly in the liver and pancreas, manifesting as liver failure and diabetes mellitus respectively. It is estimated that roughly one in every 300-400 people is affected by the disease, primarily of Northern European and especially people of Irish, Scottish, Welsh and English descent.

**Questions**

1. In sickle-cell disease, why do the red blood cells change shape?
   -
   -

2. Why are people with sickle-cell disease resistant to malaria?
   -

3. Why must sickle-cell disease be inherited from each parent in order for the individual to have the disease?
   -

4. Why can’t a person who has hemophilia maintain a blood clot?
   -

5. In what part of the world would you most likely find people with the disease of haemochromatosis?
Lesson 22.2: Multiple Choice

Name____________________________ Class_______ Date ________

Circle the letter of the correct choice.

a. Blood accounts for what percent of the human body weight?
   a. 2%
   b. 7%
   c. 10%
   d. 25%

b. Within blood plasma are ________________.
   a. erythrocytes
   b. leukocytes
   c. thrombocytes
   d. all of the above

c. Which of the following produce antibodies?
   a. B-cells
   b. T-cells
   c. macrophages
   d. lymphocytes

d. How long do platelets survive before being removed by the liver and spleen?
   a. 2 days
   b. 5 days
   c. 10 days
   d. 15 days

e. Blood plasma contains
   a. serum albumin.
   b. antibodies.
   c. hormones.
   d. all of the above

f. Which of the following is a blood group system?
   a. MNS
   b. Kell
   c. Duffy
   d. all of the above

g. Leukemia is characterized by an abnormal production of
   a. red blood cells.
   b. white blood cells.
   c. platelets.
   d. none of the above
Lesson 22.2: Vocabulary

Match the vocabulary term with the correct definition.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. thrombocytes</td>
<td>a. protein in red blood cells that carries oxygen</td>
</tr>
<tr>
<td>2. hemoglobin</td>
<td>b. a cancer of the lymphatic system, which helps to filter blood</td>
</tr>
<tr>
<td>3. erythrocytes</td>
<td>c. individuals with type AB positive blood</td>
</tr>
<tr>
<td>4. lymphoma</td>
<td>d. red blood cells</td>
</tr>
<tr>
<td>5. serum albumin</td>
<td>e. chemical messengers that are produced by one cell and carried to another</td>
</tr>
<tr>
<td>6. universal recipients</td>
<td>f. platelets</td>
</tr>
<tr>
<td>7. hormones</td>
<td>g. determined by the presence or absence of certain molecules, called antigens, on the surface of red blood cells</td>
</tr>
<tr>
<td>8. hematopoiesis</td>
<td>h. the production of blood cells in the red and yellow bone marrow</td>
</tr>
<tr>
<td>9. blood type</td>
<td>i. blood clotting</td>
</tr>
<tr>
<td>10. coagulation</td>
<td>j. a plasma protein that acts as a transporter of hormones and other molecules</td>
</tr>
</tbody>
</table>
Lesson 22.3: True or False

Write true if the statement is true or false if the statement is false.

_____ 1. The exchange of gases between the blood and the cells of the body is called internal respiration.
_____ 2. The trachea pulls air in and pushes it out.
_____ 3. Respiration is the transport of oxygen from the outside air to the cells of the body.
_____ 4. One of the products of cellular respiration is carbon dioxide.
_____ 5. The pharynx closes over the trachea when food is swallowed.
_____ 6. The alveoli are part of the upper respiratory tract.
_____ 7. In air-breathing vertebrates such as humans, respiration of oxygen includes three stages.
_____ 8. The process of gas exchange occurs in the alveoli.
_____ 9. Exhaled air has a relative humidity of 100 percent.
_____ 10. Exhalation is generally an active process.

Lesson 22.3: Critical Reading

Read this passage from the lesson and answer the questions that follow.

Homeostatic Imbalances of the Respiratory System: Diseases and Disorders

Respiratory disease is the term for diseases of the lung, bronchial tubes, trachea and throat. These diseases range from mild, such as a cold, to being possibly life-threatening, such as bacterial pneumonia.

Respiratory diseases can be grouped as either obstructive (conditions which lower the rate of the airflow into and out of the lungs, such as in asthma) or restrictive (conditions that cause a reduction in the functional volume of the lungs, such as emphysema.)

Emphysema is a chronic lung disease caused by loss of elasticity of the lung tissue. The destruction of elastic structures that support the alveoli and the capillaries that feed the alveoli cause them to become hard and stiff. Eventually the walls of the alveoli break down and the alveoli become larger. The amount of oxygen that can enter the blood with each breath is reduced because the large alveoli cannot function efficiently; much of the oxygen that gets into the large alveoli cannot be absorbed into the blood so the oxygen is unused. Symptoms include shortness of breath on exertion (usually when climbing stairs or a hill, and later at rest), and an expanded chest. Damage to the alveoli, which can be seen in Figure 1.3, is irreversible. Smoking is a leading cause of emphysema.

Bronchitis is an inflammation of the bronchi. Acute bronchitis is usually caused by viruses or bacteria and may last several days or weeks. Acute bronchitis is characterized by cough and phlegm (mucus) production. Symptoms are
related to the inflammation of the airways and phlegm production, and include shortness of breath and wheezing. Chronic bronchitis is not necessarily caused by infection and is generally part of a syndrome called chronic obstructive pulmonary disease (COPD). Chronic bronchitis is defined clinically as a persistent cough that produces phlegm and mucus, for at least three months in two consecutive years.

Asthma is a chronic illness in which the airways narrow and becomes inflamed, as shown in Figure 1.4. Excessive amounts of mucus are also made by the lungs. Asthma often happens in response to one or more triggers. It may be
triggered by exposure to an allergen such as mold, dust, or pet hair. It can also be caused by cold air, warm air, moist 
air, exercise, or emotional stress. In children, the most common triggers are viral illnesses such as those that cause the 
common cold. This airway narrowing causes symptoms such as wheezing, shortness of breath, chest tightness, and 
coughing. Some people with asthma, especially children, can become very frightened by the symptoms, which may 
cause even more breathing distress. Between asthma attacks, most patients feel well but can have mild symptoms 
and may remain short of breath after exercise for longer periods of time than a person who does not have asthma. The 
symptoms of asthma, which can range from mild to life threatening, can usually be controlled with a combination 
of medicines and environmental changes.

Public attention in the developed world has recently focused on asthma because of the increasing numbers of cases, 
affecting up to one in four children who live in cities.

Questions
1. What are the two major ways in which respiratory diseases can be grouped?

2. What happens to lung tissue in emphysema?

3. In emphysema, why is the amount of oxygen that can enter the blood with each breath reduced?

4. How is chronic bronchitis defined clinically?

5. How is asthma an example of an obstructive respiratory disease?

Lesson 22.3: Multiple Choice

Name____________________________ Class_______ Date ________

Circle the letter of the correct choice.

a. The respiratory system consists of the ____________.
   a. pharynx
   b. trachea
   c. diaphragm
   d. all of the above

b. In cellular respiration, which of the following is not produced?
   a. oxygen
   b. carbon dioxide
   c. ATP
   d. water

c. Which of the following is part of the lower respiratory tract?
a. nasal cavity  
 b. pharynx  
 c. trachea  
 d. none of the above

**d. Which of the following is one of the stages of the respiration of oxygen?**

a. ventilation from the atmosphere into the alveoli of the lungs  
 b. pulmonary gas exchange from the alveoli into the pulmonary capillaries  
 c. gas transport from the pulmonary capillaries through the circulation to the peripheral capillaries in the organs  
 d. all of the above

**e. Exhaled air has a relative humidity of what percent?**

a. 25  
 b. 50  
 c. 75  
 d. 100

**f. Immediately after the aorta, oxygenated blood travels to the**

a. peripheral capillaries.  
 b. smaller arteries.  
 c. arterioles.  
 d. none of the above

**g. Which of the following is a respiratory disease?**

a. bronchitis  
 b. pneumonia  
 c. tuberculosis  
 d. all of the above

### Lesson 22.3: Vocabulary

Match the vocabulary term with the correct definition.

**Term**

___ 1. obstructive  
___ 2. lung volume  
___ 3. emphysema  
___ 4. respiratory disease  
___ 5. internal respiration  
___ 6. restrictive  
___ 7. bronchitis  
___ 8. alveoli  
___ 9. diaphragm  
___ 10. asthma
Definition

a. the exchange of gases between the blood and the cells of the body
b. a muscle that is found below the lungs
c. conditions which lower the airflow rate into and out of the lungs
d. a chronic illness in which the airways narrow and become inflamed
e. multi-lobed sacs in which most of the gas exchange occurs
f. the average breath capacity of a person
g. conditions that cause a reduction in the functional volume of the lungs
h. a chronic lung disease caused by loss of elasticity of the lung tissue
i. an inflammation of the bronchi
j. the term for diseases of the lung, bronchial tubes, trachea and throat
1.4 References

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4. USFG. . Public Domain