Respiratory System

Course
Principles of Health Science

***Unit** IX*
Anatomy and Physiology

Essential Question
What are the tissues and systems of the human body?

TEKS
130.202 (c) 1C, 1D, 1E, 1G, 1K, 9B

Prior Student Learning
n/a

Estimated time
1-2 hours

Rationale
To pursue a career in health care, proficiency in anatomy and physiology is vital.

Objectives
Upon completion of this lesson, the student will be able to:

- Identify terms pertaining to the respiratory system
- List the parts of the respiratory system and give their location and function
- Identify terms used for types of abnormal breathing
- Recognize respiratory diseases and disorders
- Label the diagram of the respiratory system

Engage
Perform the following in front of the class using a paper towel and a hand mirror:

- Use the paper towel to clean and dry the mirror.
- Hold the mirror near, but not touching, your mouth.
- Exhale onto the mirror two or three times.
- Examine the surface of the mirror.

What happens to the mirror?
Why does the mirror become fogged?

Key Points

I. Identification of terms
   A. Breathing – inhaling and exhaling of air
   B. Cyanosis – bluish color of skin caused by oxygen deficiency in the blood
   C. Diffusion – moving of molecules from a region of higher concentration to a region of lower concentration of molecules
   D. Eupnea – normal respiration
   E. Exhalation – expulsion of air from alveoli of lungs
   F. External respiration – exchange of oxygen and carbon dioxide in the lungs and the bloodstream
   G. Inhalation – phase during which air is drawn into lungs
   H. Internal respiration – exchange of carbon dioxide and oxygen in body tissue cells and the bloodstream.
   I. Cellular respiration- use of oxygen and nutrients to produce energy, water, and carbon dioxide.

II. Organs of respiration

A. Nasal cavity (nostrils) – air enters respiratory system though nostrils
B. Sinuses – cavities in bones of skull which open into the nasal cavity
C. Pharynx – (also included in the digestive system) extends from mouth to esophagus; provides passageway for air from nostrils to trachea
D. Larynx – at upper end of trachea; contains vocal cords
E. Bronchi – branches of trachea leading to lungs
F. Lungs – pair of lobed organs in chest cavity, extending from the diaphragm to the clavicle
    1. The lungs are actually made up of tiny, thin-walled air sacs called alveoli.
    2. The actual exchange of oxygen and carbon dioxide takes place in the alveoli of the lungs.
G. Diaphragm – muscle separating the abdominal and chest cavities; contraction of the diaphragm causes air to enter the lungs
H. Pleura – serous membrane that covers the lungs and lines the chest cavity

III. Types of abnormal respiration
A. Hyperpnea – abnormally increased breathing
B. Apnea – cessation of breathing
C. Cheyne-Stokes respiration – respirations gradually increase in rapidity and volume until they reach a climax; then gradually subside, cease entirely for a few seconds, then begin the cycle again
D. Anoxia – lack of oxygen
E. Asphyxia – oxygen deficiency with a resulting increase of carbon dioxide in the tissues
F. Dyspnea- Painful or Labored breathing
G. Tachypnea- fast breathing
H. Bradypnea-slow breathing

IV. Diseases and disorders of the respiratory system
A. Asthma – allergic reaction in which the walls of the small bronchioles swell with a thick mucus secretion
B. Common cold – most widespread of all communicable diseases, characterized by swollen and inflamed mucous membranes of the nose and throat with copious discharge
C. Cough – mechanism for clearing obstructions from airway
D. Emphysema – swelling of alveoli due to chronic bronchial obstruction
E. Epistaxis – nose bleed
F. Hay fever – sensitivity to foreign proteins causing watery discharge from eyes and nose
G. Influenza – acute, contagious disease characterized by inflammation of the upper respiratory tract and generalized aches

and pains

H. Pleurisy – inflammation of the pleura – usually accompanies infections of the lung
I. Pneumonia – inflammation of the alveoli of the lung – may be caused by bacteria or viruses
J. Sinusitis – inflammation of a sinus
K. Tuberculosis – inflammation of lungs and pleurae – caused by a bacterium (Occasionally invades other parts of the body.)

Activity

I. Build a working lung. (See Activity Sheet)
II. Complete Breathing is Essential to Life Activity.
III. Label the Human Respiratory System.

Assessment

Project Rubric

Materials

Human Respiratory System Diagram
2 liter empty, clean sports drink bottles
9” helium balloons
Latex gloves
stethoscopes
watch or clock with second hand
index cards or sticky note paper with students’ names
6" and 9" balloons
tape measure
paper and pen or pencil

http://www.bioedonline.org/

Utah State Office of Education, (2005). *Medical Anatomy and Physiology Teacher Resource CD*. Utah.

Accommodations for Learning Differences

For reinforcement, the student will label a diagram of the lungs, and then make flashcards of the terminology.

For enrichment, the student will research and report on a respiratory disease/disorder.

National and State Education Standards

National Health Science Cluster Standards
HLC01.01 Academic Foundations
Health care workers will know the academic subject matter required (in

addition to state high school graduation requirements) for proficiency within their area. They will use this knowledge as needed in their role.
HLC1O.01 Technical Skills
Health Care Workers will apply technical skills required for all career specialties. They will demonstrate skills and knowledge as appropriate.

TEKS
130.202 (c)(1) (C) interpret technical material related to the health science industry;
130.202 (c)(1)(D) organize, compile, and write ideas into reports and summaries;
130.202 (c)(1)(E) plan and prepare effective oral presentations; and
130.202 (c)(1)(G) describe biological and chemical processes that maintain homeostasis.
130.202 (c)(K) identify the concepts of health and wellness throughout the life span.
130.202 (c)(9)(B) identify wellness strategies for the prevention of disease.

Texas College and Career Readiness Standards
English Language Arts
II. B. Understand new vocabulary and concepts; use them accurately in reading, writing, and speaking.
III. B. Develop effective speaking styles for both group and one-on-one situations.
IV. A. Apply listening skills as an individual and as a member of a group in a variety of settings.
IV. B. 2. Listen actively and effectively in one-on-one communication situations.

Science
1.E.1. Use several modes of expression to describe or characterize natural patterns and phenomena. These modes of expression include narrative, numerical, graphical, pictorial, symbolic, and kinesthetic.
1.E.2. Use essential vocabulary of the discipline being studied.
3.A.1. Use correct applications of writing practices in scientific communication.

Creation of a Working Model of the Lung

1. Carefully slice the bottoms off of the sports drink bottles up to the indentation of the first segment of the bottle. (2 liter soda bottles can be used but the plastic is sometimes too flimsy.)

2. Insert one balloon into the neck of the bottle and pull the lip of the balloon over the lip of the bottle.

3. Place the latex glove over the open base of the bottle.

4. Pull on the fingers to simulate the contraction of the diaphragm and watch the “lung” fill with air.

5. Release the finger of the glove to simulate exhalation.

6. Punch hole in side of bottle to demonstrate a pneumothorax, then place finger over the hole to demonstrate the effectiveness of an occlusive dressing.

Breathing Is Essential to Life

Objective:
Students will recognize that breathing is an automatic process. Observe and record data on respiratory rate. Demonstrate how air enters and leaves the lungs. Observe how respiratory rate changes with different activities.

ACTIVITY #1: **Listen to and Count Breathes per minute**

Material: stethoscopes
watch or clock with second hand
index cards or sticky note paper with students' names

Strategy:
Divide the students into teams of at least two.
Use a stethoscope to listen to one another's breathing. Have one hold their breath as long as possible. Record the time. Now record how long the partner can hold their breath. Pair off students: **Breather**: All students sit quietly (lie down if possible) with hands placed over their stomachs or chests. **Observers**: The observers must watch their partners and count the breaths taken in one minute (count ONE breath for every time the stomach or chest rises). Teacher cues the observer when to begin and when to stop after 60 seconds. After the 60 seconds, the observer tells the breathers how many breaths were counted. Then all breathers record their at rest information on the index card or sticky note paper. Students trade places and repeat the activity. Next, students do jumping jacks for sixty seconds and then run in place for 60 seconds before recording breathing rates as previously described.

Discussion:
In which case did you breathe more? Why?
Do you think respiration rate would be faster or slower if you ran for 10 minutes before counting breaths?
Would there be a difference in your respiration rate if you checked it when you were sleeping and then again if you were walking?

ACTIVITY #2: Measuring Lung Capacity With Balloons

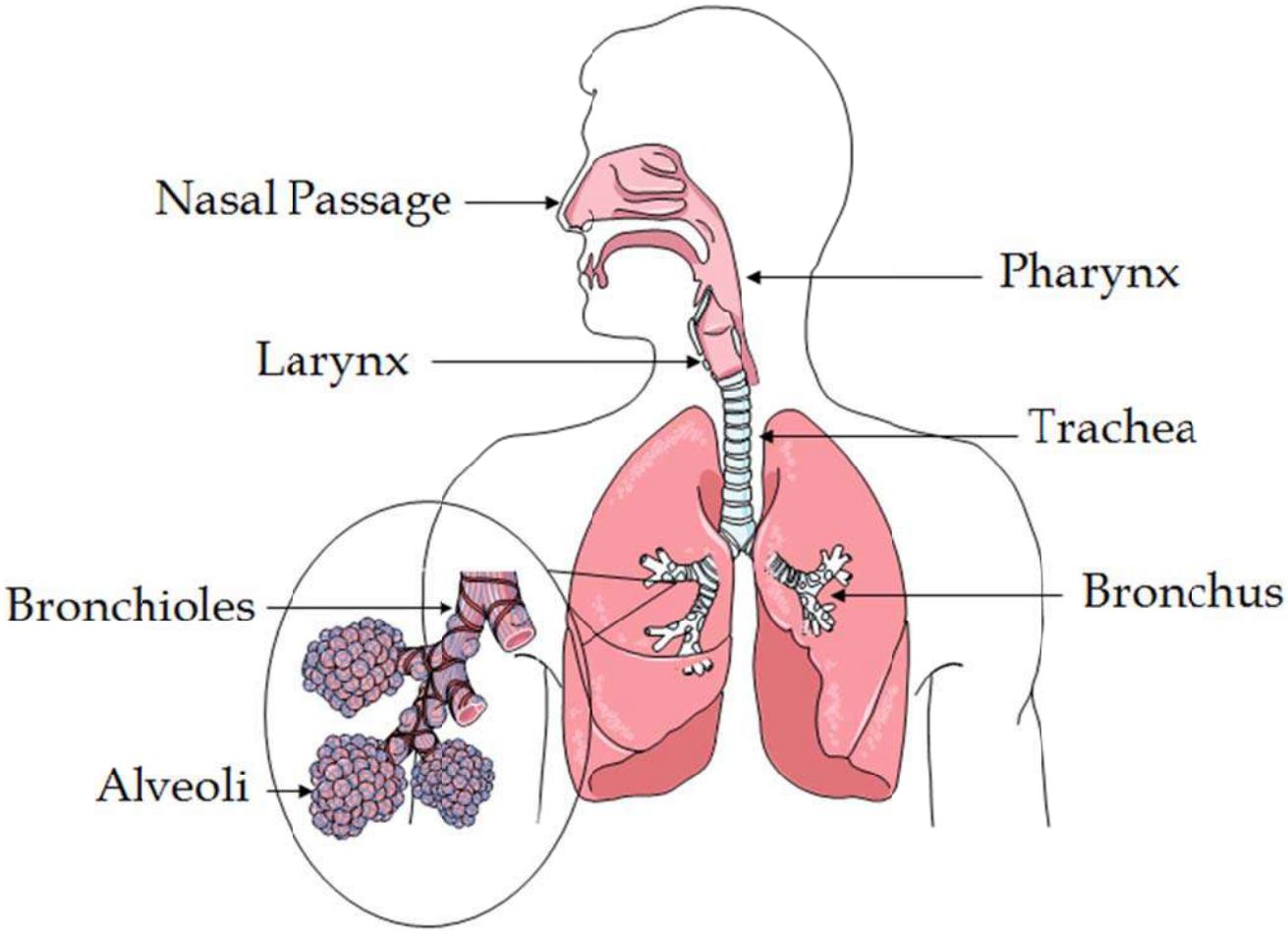
MATERIALS:
6" and 9" balloons
tape measure
paper and pen or pencil

CAUTION: *Do not do this activity if you have asthma!*
Give identical balloons to pairs of students. Instruct each to blow up a balloon as much as possible with only one breath. Measure around everyone's balloon with a tape measure and write down the measurement next to the student's names. Let air out of balloons and repeat two more times. Take an average of three tests.

Discussion:
Who was able to blow the most air into their balloon?
What is it about the person that enables him or her to do this?
If you ran in place for 2 - 3 minutes, would you be able to blow as much air into the balloon? Try it.

("Medical anatomy and," 2005)

Human Respiratory System Diagram



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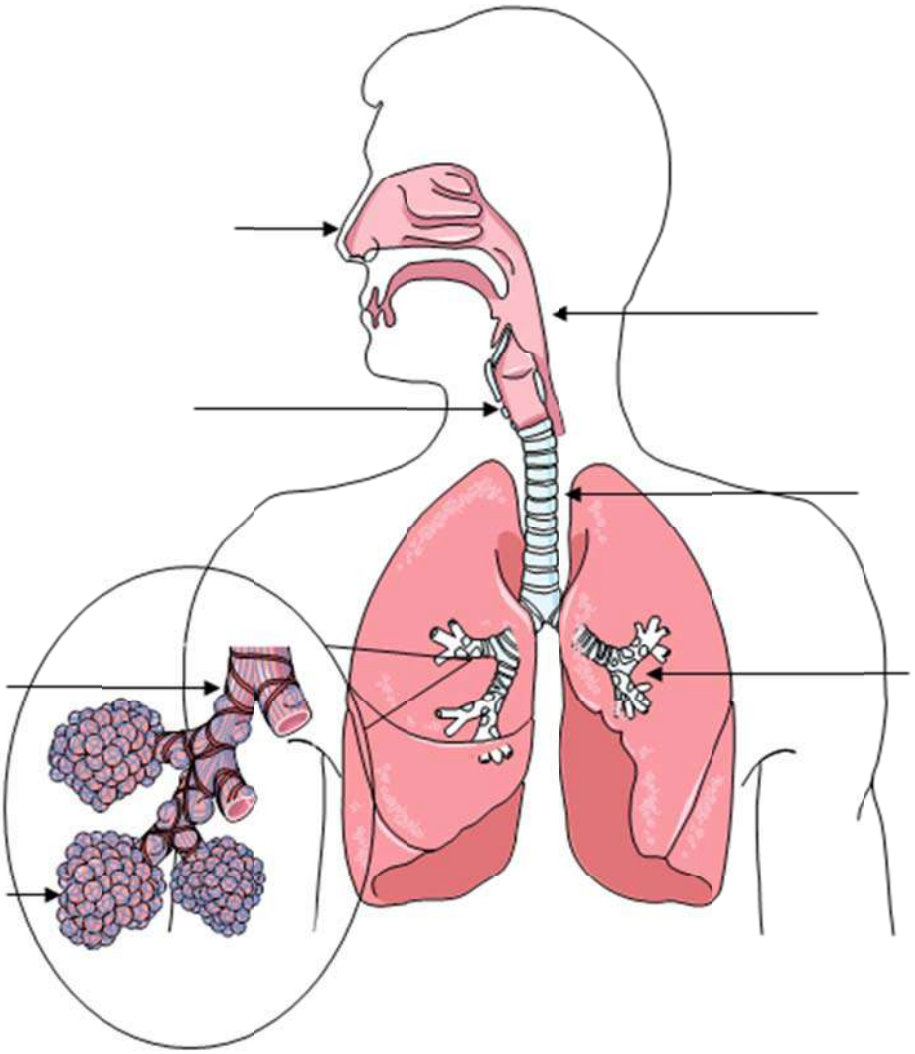
Label Human Respiratory System



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