

Structure and Function

Cluster Two: CIRCULATION AND RESPIRATION

Inquiry #7: THE RESPIRATORY SYSTEM

(4 instructional periods)

Concept: "The human organism has systems for respiration. These systems interact with one another" (NSES, pg. 156). "Lungs take in oxygen for the combustion of food and they eliminate the carbon dioxide produced" (AAAS, pg. 137).

Objective: Students will be able to label the structures and functions of the respiratory system. They will be able to give a written explanation as to how the respiratory and circulatory systems work together to carry gases and other materials through the body.

Summary: Students observe the process of respiration to discover the mechanics of breathing. They will build a model of the lungs and diaphragm and use the CD-ROM to visit the Oxygen twins as they take a trip through the respiratory system to discover how the parts of the respiratory system work with the circulatory system.

Teacher Background: The human body needs oxygen. Oxygen gets into our bodies in the air we breathe. The process of taking in oxygen and expelling carbon dioxide is called respiration.

It is important to point out to students that the systems of the body are interdependent. The respiratory system takes in oxygen that cells need and removes carbon dioxide waste. The circulatory system carries oxygen and nutrients, carbon dioxide and wastes to and from the cells in our body. Cells die without a continuous supply of oxygen and the removal of wastes. Energy for all cell processes comes from food. Oxygen taken in by the lungs is taken to the cells via the bloodstream. There, broken down food molecules, also delivered by the bloodstream, and oxygen combine to form needed cell energy (ATP). This process, cellular respiration, takes place in the mitochondria. Carbon dioxide, a waste by-product of cellular respiration, leaves the cells and travels through the bloodstream back to the lungs where it can exit the body.

In humans, the primary structures of the respiratory system include the nose, mouth, trachea, bronchi, lungs, and diaphragm. As air passes through the nose it is warmed and moistened. Tiny hairs found inside the nose filter air. These tiny hairs trap dust particles. Air that enters through the mouth is filtered by the mucus that lines the respiratory tract.

The air from both the nose and mouth meet at the back of the throat. This air passes from the back of the throat to the **trachea**. The trachea is the passageway to the lungs. The trachea contains rings of cartilage that give it a more rigid structure. At the top of the trachea lies the voice box or **larynx**. The larynx contains the vocal cords. The vocal cords vibrate when air is forced over them. We learn to control these vibrations when we speak and sing.