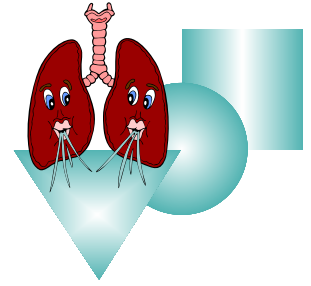


# Geography of Pulmo Park

## Student Background Information in Dialectic Form 1A



### Activity Background:

Can you imagine that each day we breathe in about 20,000 times and by the time we're 70 years old, we will have taken at least 600 million breaths? Breathing could not take place without the respiratory system and its vital parts. Chief among these parts are the *lungs* (lungz).

The lungs are divided into *lobes* (lowbz) and work closely with the heart for pulmonary circulation at the *hilum* (hy-lum). The *hilum* (formerly called a *hilus*) is a depression or pit in an organ where structures such as blood vessels and nerves enter. The *heart* (hart) and lungs are attached to the *mediastinum* (me-dee-ass-ti-num), and are protected by the *ribs* (ribz). The ribs attach to the backbone and *sternum* (stir-num) which is in the front, center chest, forming a protective cage. With every breath, we take in oxygen-rich air through our nose and mouth and our lungs fill up. Oxygen passes out of the lungs into *capillaries* (kah-puh-ler-eez) found deep within the lungs. Once in the bloodstream, oxygen binds to red blood cells and moves through the *pulmonary veins* (pul-ma-near-ie veins) to the heart. The heart pumps the oxygen-rich blood out to all parts of the body. Body cells use the oxygen from the blood and release carbon dioxide waste, which is carried back to the heart. The *pulmonary arteries* (pul-ma-near-ie r-te-rees) carry oxygen-poor blood to the lungs, where carbon dioxide is released and breathed out.

**Think: How does the design (structure) of the Pulmonary System allow it to do its job (function)?**

**Think: How does the structure protect the delicate organs of the Pulmonary and Circulatory Systems?**

Living things are arranged according to *levels of organization*. The most basic level of organization is the *cell*. In a living thing made of more than one cell, cells can organize into *tissues* to do a specific job. For examples, blood cells can organize themselves into blood tissue. In more complex living things, tissues can organize into *organs* and work together to do a particular job. For example, blood tissue, muscle tissue, and nerve tissue form a heart, an organ that pumps blood to all parts of the body. Finally, in very

### Reflections, Responses

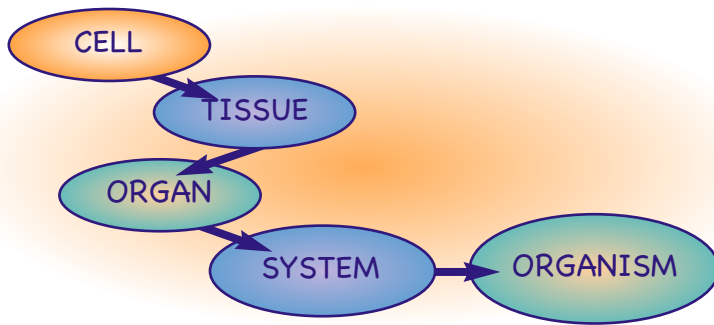
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complex living things, organs work together as *systems* to accomplish a particular job. Many systems working together form a living *organism*. See *Figure 1*.



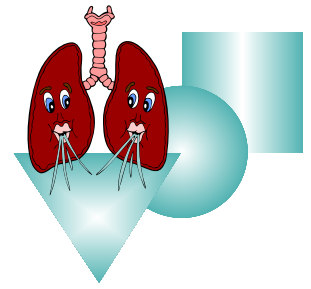
**Figure 1 Levels of Organization**

**Think:** Describe the levels of organization in living things. Why is an organ level more complex than a tissue level?

A *system* is defined as a group of independent but interrelated parts that work together as a whole for a common purpose. For example, the *heart, blood, and blood vessels* make up the *circulatory system*. The *heart* is an organ with its own job (function); to pump blood. The *blood* also has its own job, which is to carry nutrients, oxygen, and carbon to fight infections, etc. The *blood vessels* carry blood from one part of the body to the other. Each does its job well, but without the other parts, none can do the whole job of the circulatory system – it takes all working together. Similarly, the *Respiratory System* is made of its own parts working together to accomplish the job of respiration. In a wonderful display of cooperation, these two systems with their own *structure* (design) and *functions* (jobs), work closely together to supply oxygen and to remove wastes from all parts of the body. If we didn't breathe, we couldn't live. It's one of the most important functions our bodies perform.

**Think:** How do the Circulatory and Pulmonary Systems work closely together? Why are they considered separate systems?

At the top of the respiratory system, the *nostrils* (nas-strels) act as the air intake, bringing air into the nose, where it's warmed and humidified. The *sinuses* are located behind the nostrils and are actually air pockets located inside the bones in the skull. They are lined with tiny hairs called *cilia* (sih-lee-uh) that protect the nasal passageways and other parts of the respiratory tract, filtering out dust and other particles that enter the nose with the air. *Mucus*



## Reflections, Responses

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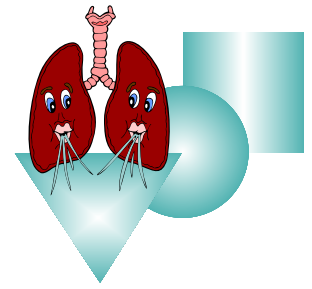
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As reported by the *World Health Organization*, globally more than 1.5 million deaths annually from respiratory infections are attributable to the *environment*, including at least 42% of lower respiratory infections and 24% upper respiratory infections in developing countries. Respiratory infections are one of the biggest killers of children under the age of five. Most of these diseases are preventable because they are by products of a polluted environment.



**Think: Why is air quality so important to respiratory health? (Think about the structure and function of the lungs)**

Even if the air we breathe is dirty or polluted, our respiratory system along with our immune system can defend against foreign matter and/or organisms that enter through the nose and mouth. Pollutants are trapped by hair or mucus, breathed out again, coughed up, swallowed, passed out through the intestines or destroyed by digestive juices, or destroyed by macrophages (a type of blood cell that patrols the body looking for germs to destroy). But when this system fails, things can go wrong in the respiratory system.

**Think: How is our Pulmonary System designed to defend against pollutants in the air we breathe?**

The respiratory system is susceptible to a number of diseases, and the lungs are prone to a wide range of disorders caused by pollutants in the air. Sometimes these diseases are noted throughout family history.

More than 20 million people in the United States have *asthma* (az-muh), and it's the number-one reason students chronically miss school. Asthma is a *chronic inflammatory lung disease* that causes airways to tighten and narrow. Often triggered by irritants in the air such as cigarette smoke, asthma flares involve contraction and swelling of the muscles around the tiny airways. The resulting narrowing of the airways prevents air from flowing properly, causing wheezing and difficulty breathing, sometimes to the point of being life-threatening. Management of asthma starts with an asthma management plan, which usually involves avoiding asthma triggers and sometimes taking medications.

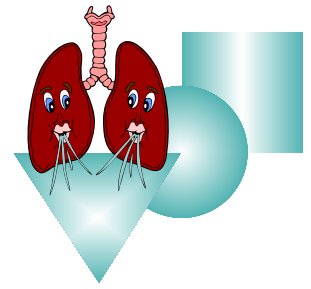
## Reflections, Responses

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Think: Why is it important for an individual to know what triggers his or her asthma attacks?



*Chronic obstructive pulmonary disease* (COPD). COPD is a term that describes two lung diseases - *emphysema* and *chronic bronchitis*. Long-term smoking often causes *emphysema* (em-fuh-zee-muh), and although it seldom affects children and teens, it's a condition that can have its roots in the teen and childhood years. Talking to students about tobacco smoke is a key part of preventing smoking-related diseases like emphysema and lung cancer. With *emphysema*, the lungs produce an excessive amount of mucus, and the alveoli become damaged. It becomes difficult to breathe and get enough oxygen into the blood. With *bronchitis* (brahn-ky-tus), a common disease of adults and adolescents, the membranes lining the larger bronchial tubes become inflamed, and an excessive amount of mucus is produced. The person develops a bad cough to get rid of the mucus. *Cigarette smoking* is a major cause of chronic bronchitis in teens.

Think: How can knowing the causes of COPD help prevent the disease from developing?

Other diseases such as the *common cold* (caused by over 200 different viruses), *influenza*, *cystic fibrosis*, and *pneumonia* also contribute greatly to respiratory problems. But, no disease is scarier than *lung cancer*. Caused by an abnormal growth of cells in the lungs, lung cancer is a leading cause of death in the United States and is often caused by smoking cigarettes or breathing second-hand smoke. It starts in the lining of the bronchi, and takes a long time to develop. Symptoms include a persistent cough that may bring up blood, chest pain, hoarseness, and shortness of breath.

Think: Why is there no cure for the common cold?

*Apnea* is a medical term that means someone has stopped breathing. *Apnea of prematurity* (AOP) is a condition in which premature infants stop breathing for 15 to 20 seconds during sleep. Apnea of prematurity generally occurs after 2 days of life and up to a week of life. The lower the infant's weight and level of prematurity at birth, the more likely the child is to have AOP spells. *Sleep apnea* affects teens and adults. The most common type of sleep apnea is obstructive sleep apnea, which happens when the upper airway gets blocked during sleep. Most often, the blockage happens

## Reflections, Responses

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