C.1. Introduction to the Respiratory System

A. A simple introduction:

1.
The **respiratory system** consists of several parts:

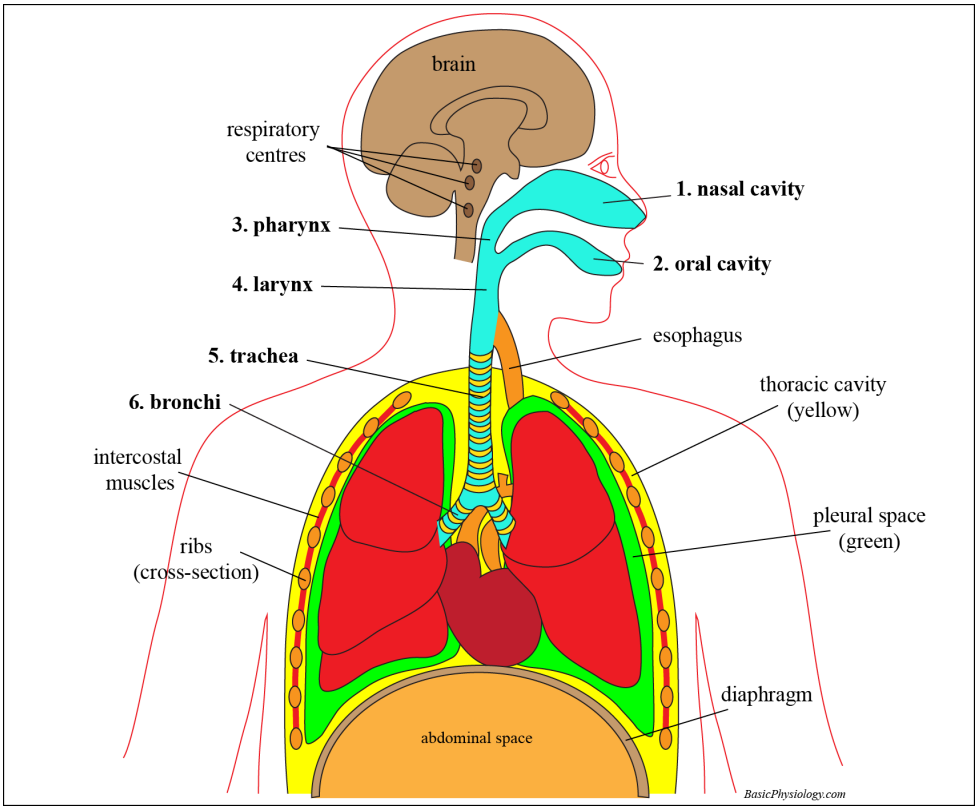
1. the upper airways
2. the lungs (left and right)
3. the blood vessels
4. the chest wall
5. the brain

2.
The **task** of the respiratory system is to get fresh air, especially **oxygen** (O_2), into the lungs and to get rid of the gaseous waste, **carbon dioxide** (CO_2), that we are constantly producing (with our metabolism).

3.
The **upper airway** transports the air between the outside world and the lungs. It consists of:

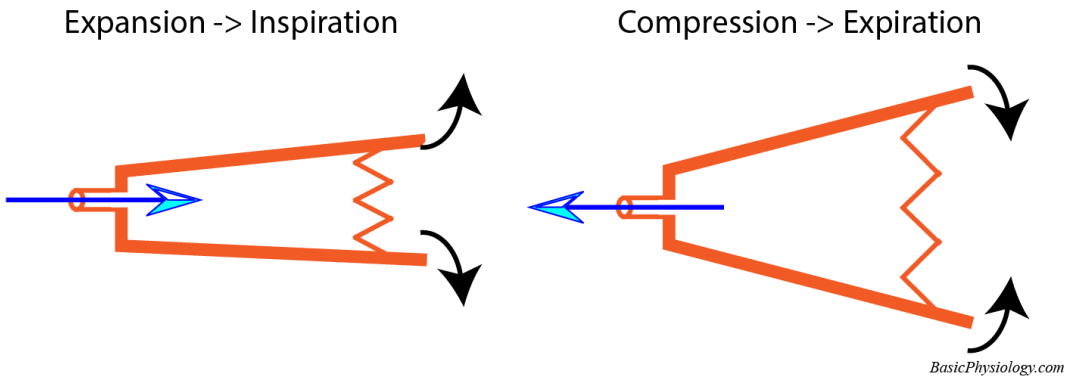
1. the nose (nasal cavity)
2. the mouth (oral cavity)
3. the pharynx
4. the larynx
5. the trachea
6. the bronchial tree

4.
The lungs are the organs where fresh air gets very close to the blood. This occurs in the **alveoli** (singular: alveolus), at the end of the bronchial tree. In this location, the **gas exchange** between air and blood occurs.



5. So, the respiratory system also needs arteries to bring oxygen-poor blood to the lungs and veins to take oxygen-rich blood away from the lungs. This blood is pumped, through the lungs, by the right heart (*link* see CVS).	6. Crucial for a proper functioning of the respiratory system is the **chest wall** and the **diaphragm**. These can expand and contract, thereby expanding the size of the chest, which, in turn, expand or constrict the lungs.
7. Finally, in contrast to the heart, which has its own pacemaker, the lungs are not automatic; they don't have a pacemaker. Instead, the "pacemaker" of the lungs is located in the **brain**, in the brain stem. Without your brain, no respiration!	

B. Do you remember how an old-fashioned air bellow works?

1. The bellow is used to blow air into a fireplace. This makes the fire much hotter; by blowing more oxygen into the fire. Also often used by the blacksmith to make the fire hotter.	
2. To get it to work, you first have to expand the bellow, thereby sucking air into the bellow.	3. Then, by compressing the bellow at the two handles, one "pushes" the air forcefully into the fireplace.
 *animation*	
4. The lungs work in the same manner. Expansion of the chest (expansion of the bellow) will make the air flow into the lungs; this is **inspiration**!	5. The opposite action, compressing the bellow, or the chest, will push the air out of the lungs; this is called **expiration**.