The Mechanism of Breathing

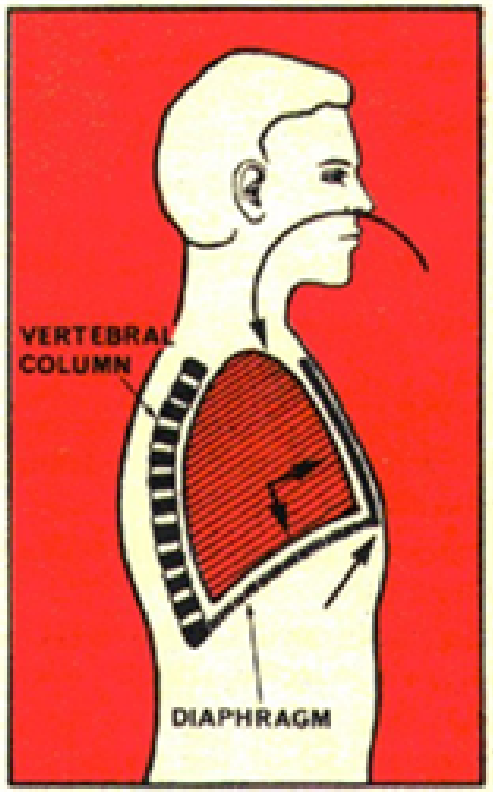


Fig. 63—Inspiration.

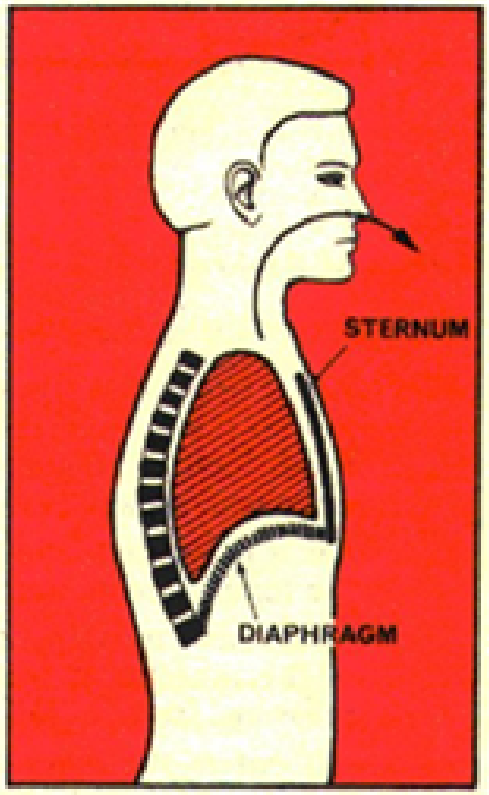
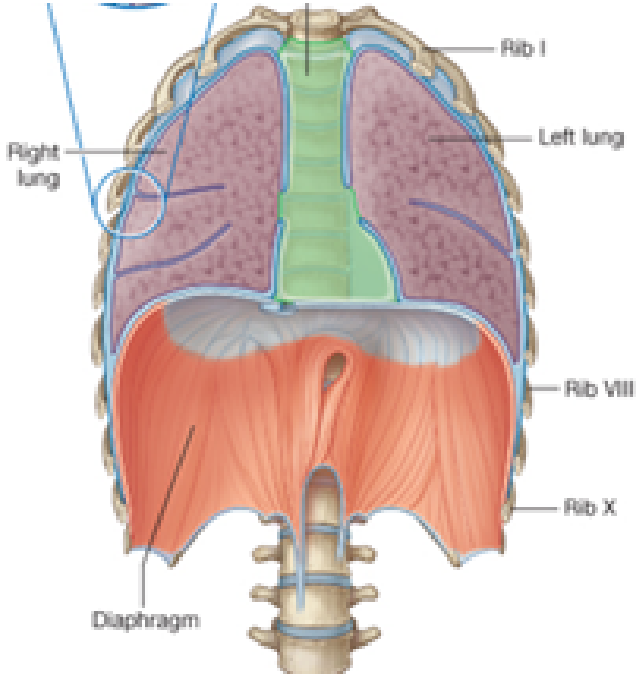


Fig. 64—Expiration.

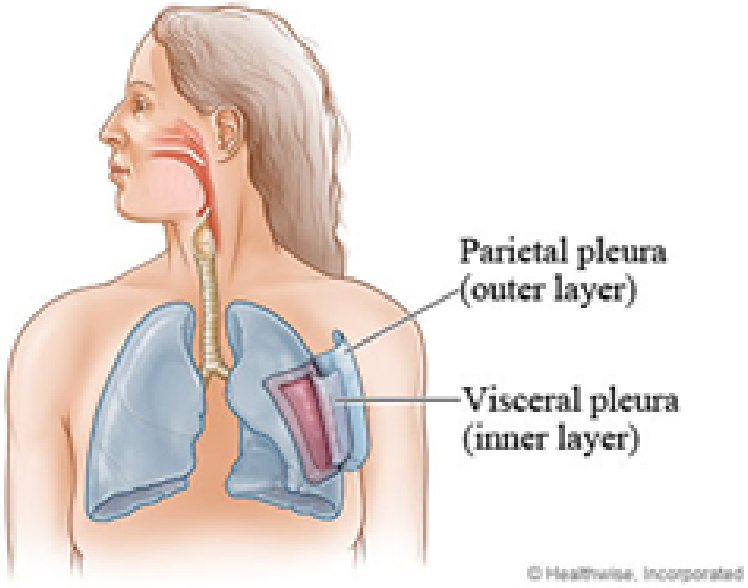
Ventilation - The manner in which air enters and exits the lungs

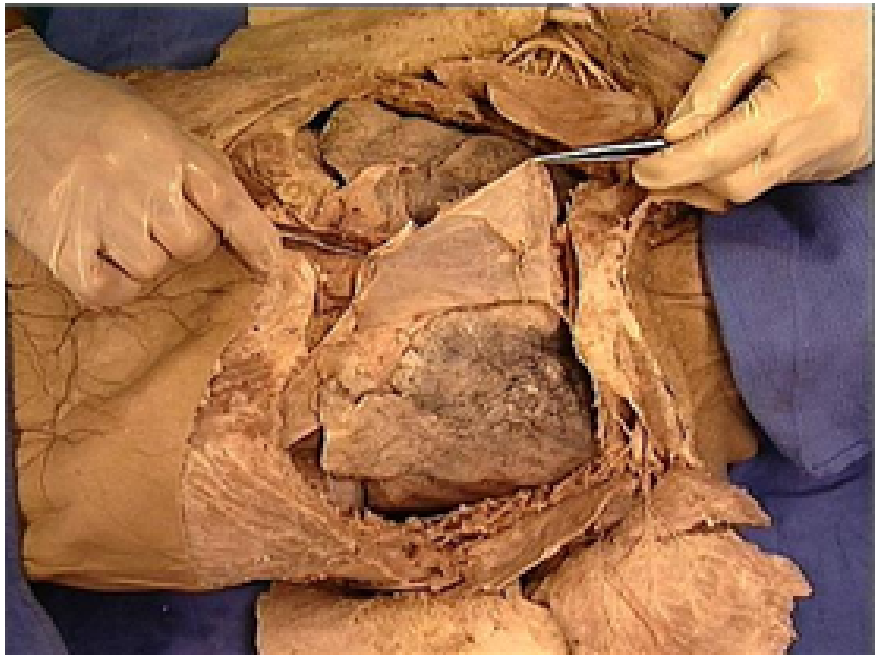
In order to understand ventilation, we need to be aware of the following:

1. The lungs lie within the sealed-off thoracic cavity. The ribcage forms the top and sides of the thoracic cavity and intercostal muscles lie between the ribs. The diaphragm and connective tissue form the floor of the thoracic cavity.

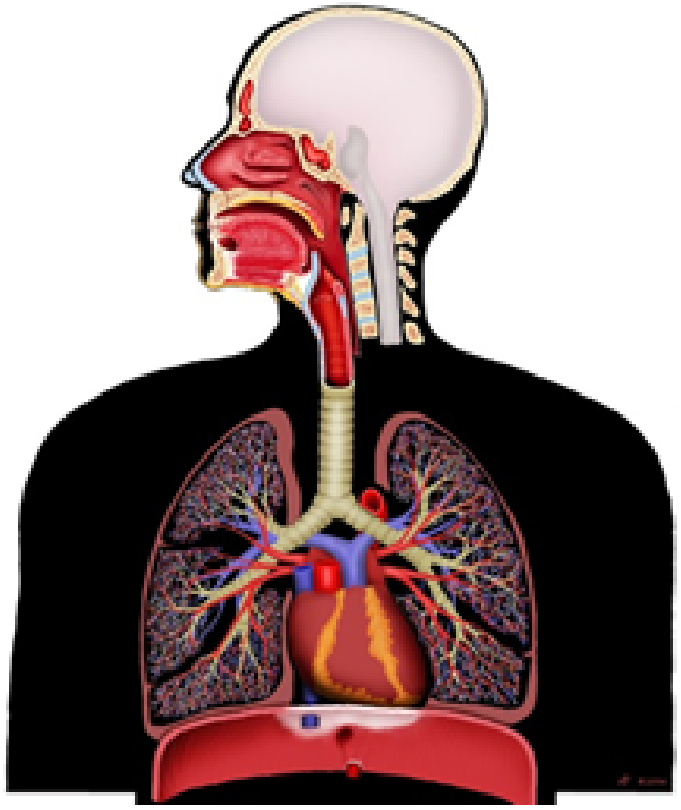


2. The lungs adhere to the thoracic wall by the pleurae. Visceral pleura attaches to the parietal pleura covering the chest wall by using the force of surface tension created by fluid in between them.





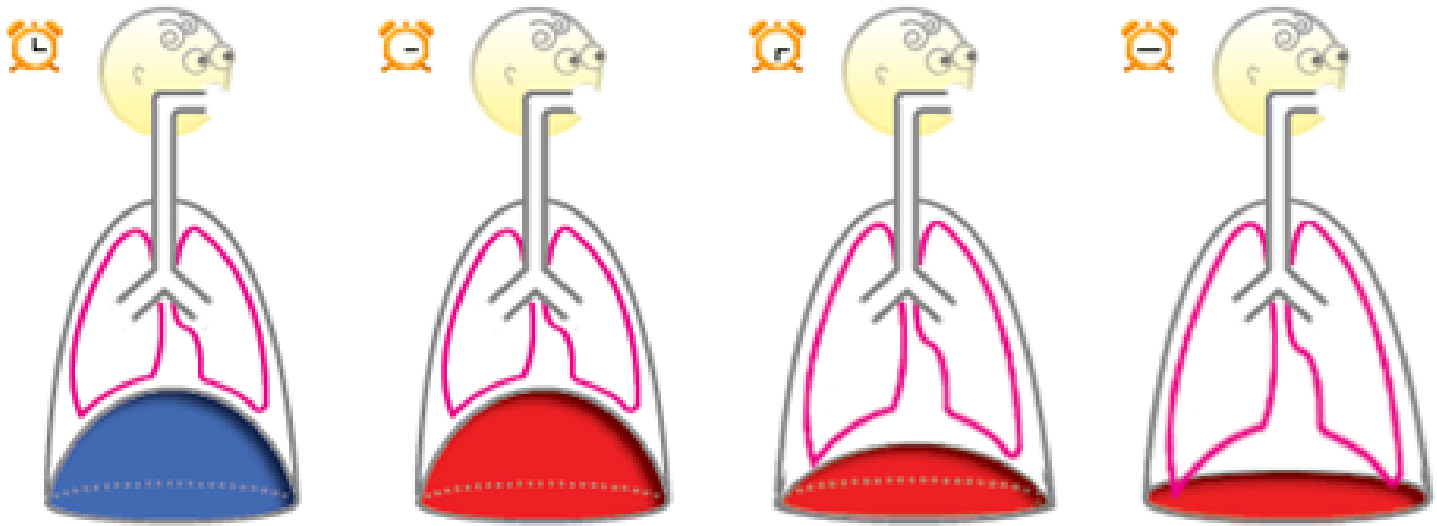
3. A continuous column of air extends from the pharynx to the alveoli of the lungs.



Inspiration

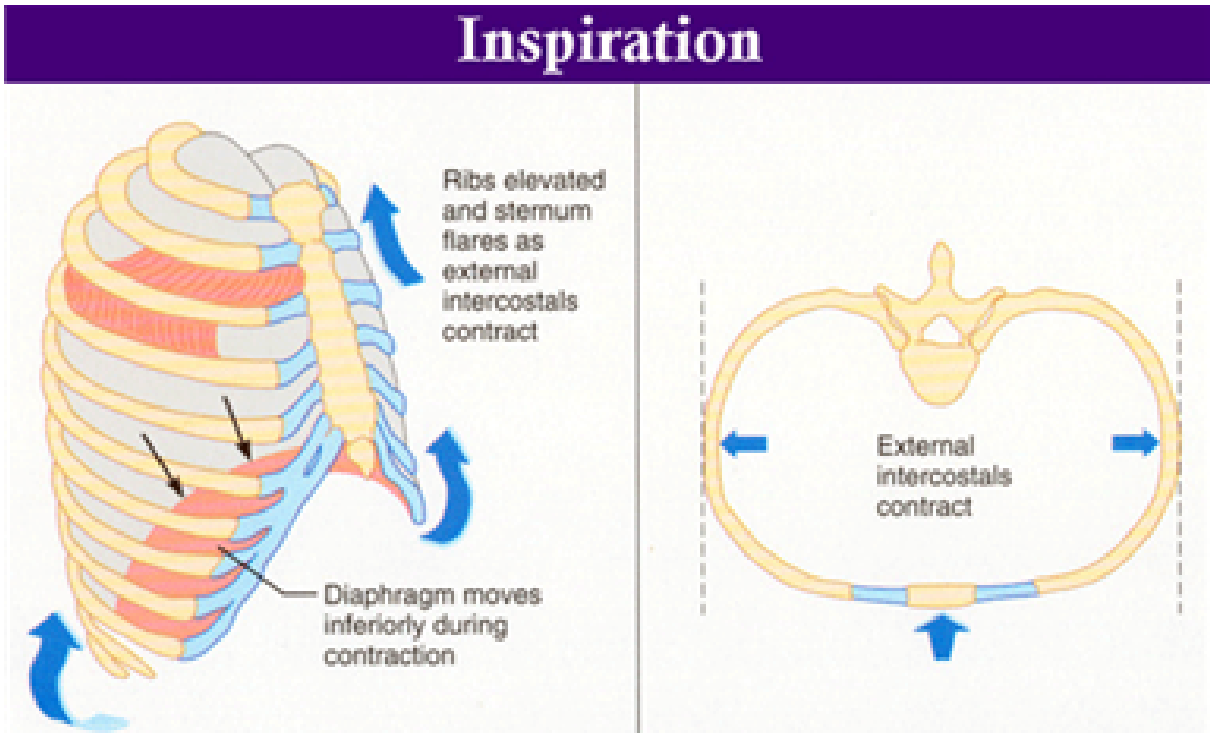
- The active phase of ventilation because this is the phase in which the diaphragm and the external intercostal muscles contract

- In its relaxed state, the diaphragm is dome-shaped but during inspiration, it contracts and becomes a flattened sheet of muscle



Inspiration

- As the diaphragm is flattening, the external intercostal muscles contract and the ribcage moves upward and outward.

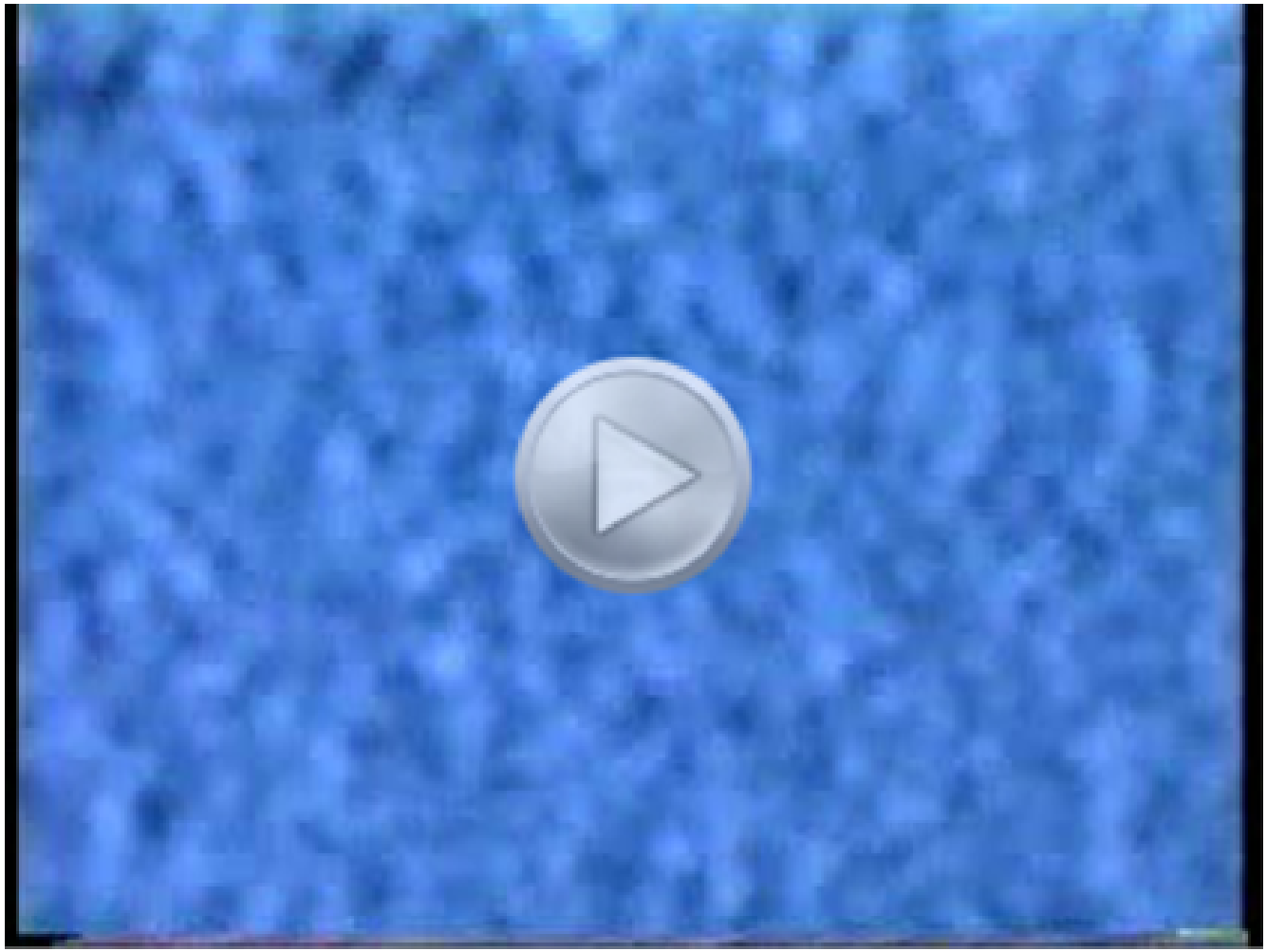


Inspiration

- As thoracic volume increases, the lungs increase in volume as well

- As lung volume increases, the air pressure within the alveoli decreases creating a vaccuum (alveolar pressure is now less than atmospheric pressure)

- Because a continuous column of air fills the lungs, air will naturally flow from outside the body into the respiratory passages and into the alveloli and equal out the pressure



Expiration

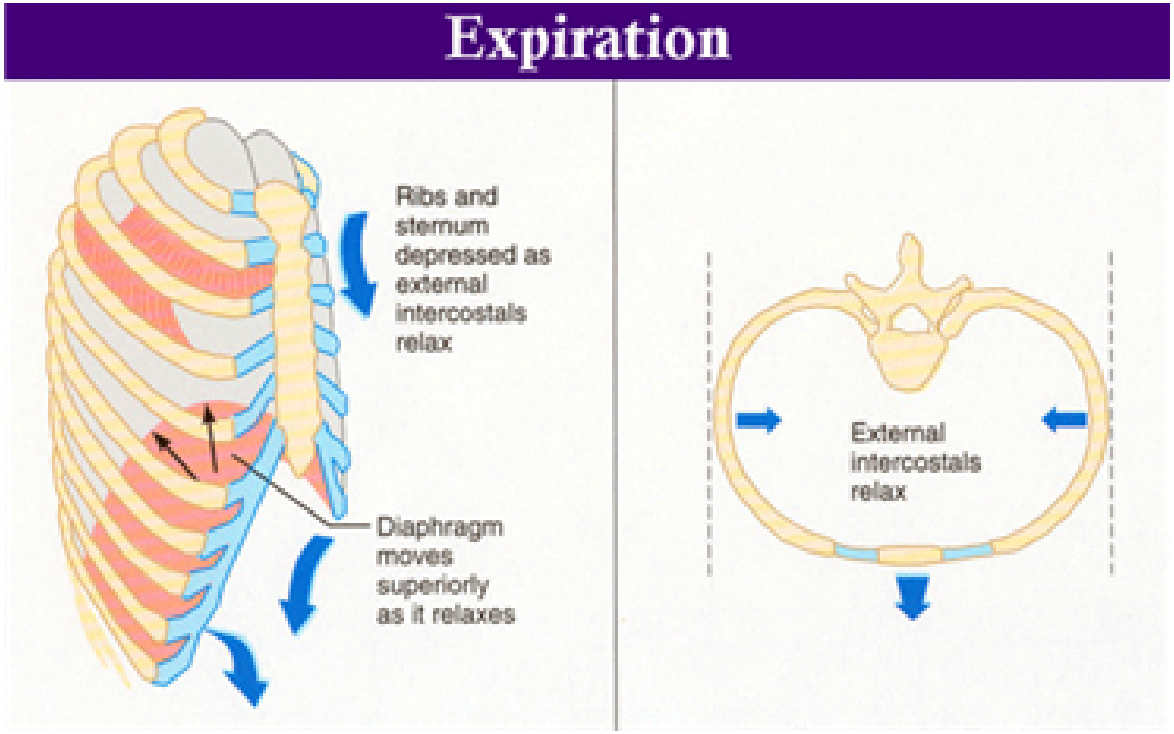
- Known as the passive phase of ventilation as no muscular effort is required to bring it about

Expiration

- During expiration the diaphragm and external intercostal muscles relax and the diaphragm resumes its dome shape

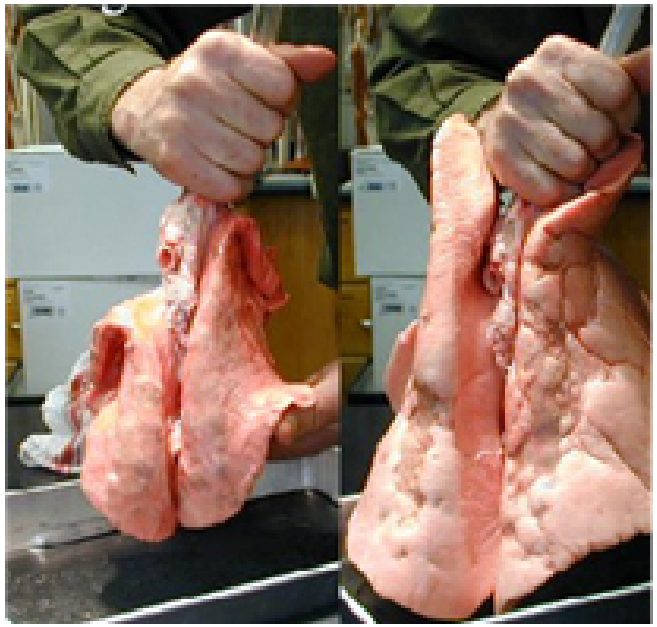
Expiration

- Rib cage moves down and in



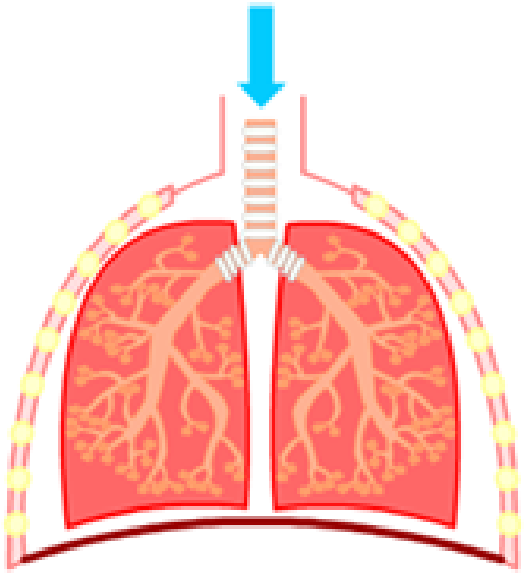
Expiration

- As the volume of the thoracic cavity decreases, the lungs are free to recoil
  - Lung recoil is possible due to the elastic tissue built into the lung's walls

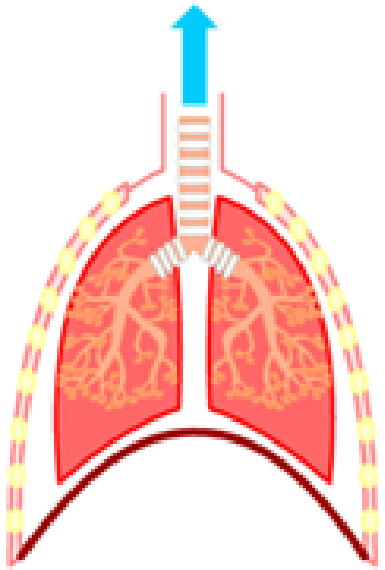


Expiration

- As thoracic cavity volume and lung volume decrease, the air pressure within the alveoli increases above atomospheric pressure and air will naturally flow out of the body until there is an equal pressure



As the volume of chest increases, the pressure inside the chest is lowered. Atmospheric pressure forces air in to the lungs. The lungs expand until the pressure is equal inside and out.



As the volume of the chest decreases, the pressure increases. Air is forced out of the lungs until the air pressure inside and out of the chest is equal again.