left lung – smaller, 2 lobes separated by oblique fissure
  8-9 bronchopulmonary segments
right lung – three lobes separated by oblique and horizontal fissure
  10 bronchopulmonary segments
lobules are the smallest subdivisions, served by bronchioles and their branches
trachea → primary bronchi → secondary (segmental) bronchi → tertiary bronchi → bronchioles → terminal bronchioles

**Respiratory zone**: site of gas exchange – microscopic structures: respiratory bronchioles, alveolar ducts and alveoli

**Conduction zone**: conducts air to gas exchange sites – includes all other structures
  branches from trachea to terminal bronchioles are conducting airways. They do not participate in gas exchange!!

respiratory muscles: diaphragm, intercostals, etc.

**Pulmonary Lobule** = functional unit of respiratory system
  lymphatic vessel, arteriole, capillary bed, venule, terminal bronchiole and alveolar sacs

transpulmonary pressure = 4 mmHg (760-756 mmHg) keeps airways open, the greater the trans pressure, the larger the lungs

intrapleural pressure = -4 mmHg (756 mmHg) fluctuates with breathing but always a negative pressure

intrapulmonary / intra-alveolar pressure = 0 mmHg (562-760 mmHg) fluctuates with breathing (758 when air comes in, 762 when air goes out)

inhalation is active, exhalation is passive (AT REST)

**Boyles Law**: pressure of a gas in a closed container is inversely proportional to the volume of the container

inhalation muscles consume energy to overcome factors that hinder air passage and pulmonary ventilation:
  airways resistance – friction; \( F = \frac{\text{change in } P}{R} \); resistance is usually insignificant
  copd narrows / obstructs airways, greater pressure differences are needed to maintain flow, atm pressure doesn’t change so intrapulmonary pressure has to
    - emphysema, chronic bronchitis
  alveolar surface tension
  lung compliance – amount of effort needed to stretch lungs and chest wall; elastic fibers!
    decreased compliance – scar tissue from tuberculosis, or pulmonary edema; emphysema – destruction of alveolar wall leaving an air pocket, destruction of elastic fibers → lungs inflate easily but elastic recoil doesn’t work

**Lung Volumes and Capacities**
  normal breathing = 12 breaths/min
  normal volume air inspired and expired = 500mL (TIDAL VOLUME)
  minute ventilation = total volume of air inhaled and exhaled each minute; breathing frequency x TV