7.2 Breathing and Respiration

In this section, you will:

- **Explain** the mechanics of breathing
- **Explain** how gases are exchanged between the human respiratory system and the external environment
- **Perform** an experiment to examine factors that affect the rate of respiration

### The Mechanics of Breathing

**Inhalation**

- External ribs muscles and diaphragm contract
- Rib cage expands up and out and the floor of the chest cavity downward
- Volume in the thoracic cavity increases, pressure decreases
- Air pressure in the lungs becomes less than external environment
- Air moves from high to low pressure and rushes in

**Exhalation**

- External ribs muscles and diaphragm relax
- Rib cage relaxes down and in and the floor of the chest cavity upward
- Volume in the thoracic cavity decreases, pressure increases
- Air pressure in the lungs becomes more than external environment
- Air moves from high to low pressure and rushes out
Respiratory Volume - Spirograph

- Measures the amount of air that moves into the lungs with each breath. Each of the following are considered:
  - Tidal Volume
  - Inspiratory reserve
  - Expiratory reserve
  - Vital Capacity
  - Residual Volume

Continued...

- **Tidal Volume** – volume of air normally inhaled or exhaled
- **Inspiratory reserve** – additional volume of air that can be taken in beyond tidal volume
- **Expiratory reserve** – additional volume of air that can be expelled beyond tidal volume
- **Vital Capacity** – total lung capacity including reserve space
- **Residual Volume** – amount of gas that remains in the system even after exhalation – never leaves the respiratory system or lungs would collapse

### A Typical Spirograph

[Diagram showing a spiograph with volume and time axes]

### External vs. Internal Respiration

**External respiration (A)** occurs between alveoli and the capillaries next to them. As blood moves away from the body tissues, it is oxygen-poor and carbon dioxide-rich. As it moves through the lung capillaries, oxygen from the air in the alveoli diffuses into the capillaries and carbon dioxide diffuses out of the blood.

**Internal respiration (B)** occurs between the capillaries and the body tissues. Oxygen diffuses from the blood into the oxygen-poor tissues while carbon dioxide diffuses from the tissues into the blood.
Homework:

• Lab next class - Rate of Respiration
• Section 7.2 – Review
• Pg. 254 # 2,3,4a,5,7,9