GUIDED NOTES (Teacher): THE RESPIRATORY SYSTEM

(Textbook Section 2.1, pages B37–B43)

Your Body Needs Oxygen!

- **Respiratory System** - The body system that brings oxygen into the body from the environment and removes carbon dioxide (CO_2) and other waste products out from the body.
- Main purpose: Gas Exchange (Oxygen IN, Carbon Dioxide OUT)
- The process of using oxygen involves both mechanical movement and chemical reactions.
  - Air is transported into your lungs by mechanical movements.
  - Oxygen is used during chemical reactions that release energy in your cells.

Exchanging Oxygen and Carbon Dioxide

- Without oxygen, cells in the body die quickly.
- Oxygen enters the body when you inhale.
- Oxygen is then transported to cells throughout the body by red blood cells.
- The air you breathe contains only about 20% oxygen and less than 1% carbon dioxide.
- It is important to exhale CO_2 because high levels of it will damage cells.
- Proper levels of CO_2 and oxygen are required for our body to maintain homeostasis. If levels of oxygen or CO_2 levels change too much, your brain signals the body to breathe faster or slower.

Cellular Respiration

- Cellular Respiration – A process in which cells use oxygen to release energy stored in sugars.

  Cellular respiration occurs in cells as they use O2 in chemical reactions to release energy.
- The respiratory system works with the circulatory system and digestive system to make cellular respiration possible.
- Cellular Respiration requires glucose (sugars from food) and oxygen (from breathing) to release energy. Carbon dioxide is a waste product of the process and must be removed from the body.
- Remember:

glucose + oxygen → carbon dioxide + water + energy

Structures in the Respiratory System

- Nose, Nasal Cavity, Throat, Epiglottis, Trachea
  - When you inhale, air enters your body through your nose or mouth.
  - Inside your nose, tiny hairs called cilia filter dirt and particles out of the air.
  - Mucus, a sticky liquid in your nasal cavity, also filters the air by trapping particles.
  - The nasal cavity warms the air before it moves down your throat and into your windpipe (trachea).
  - The trachea is a tube surrounded by rings of cartilage, which keep the tube open.
  - The epiglottis is a flap in your throat that keeps food and liquids from entering your lungs. It also helps keeps most air out of your stomach.

- Lungs and Bronchial Tree
  - The lungs are two large balloon-like organs located on either side of the heart. They are protected by the rib cage.
  - When you breathe, air enters the throat, passes through the trachea, and moves to the lungs through structures called "bronchial tubes."
  - The bronchial tubes branch throughout the lungs into smaller and smaller tubes called "bronchioles."
  - At the end of the smallest tubes (bronchioles), air enters tiny round
    - sacs called "alveoli."
  - The walls of alveoli are only one cell thick!
  - Oxygen passes from the inside of the alveoli into the blood, and carbon dioxide waste is passed from the blood into the alveoli.
  - Alveoli are an important part of the body's gas exchange!
  - The bronchial system (bronchial tubes, bronchioles, alveoli) in the lungs is sometimes referred to as the "bronchial tree," because it looks a lot like an upside-down tree.

- Ribs and Diaphragm
  - The rib cage encloses a space inside your body called the "thoracic cavity."
  - Some ribs are connected by cartilage to the sternum or to each other, making the rib cage flexible. This flexibility allows the rib cage to expand when you breathe, making room for the lungs to expand and fill with air.
  - The diaphragm is a large muscle that stretches across the floor of the thoracic cavity.
    - When you inhale, your diaphragm contracts, making the lungs expand.
    - When the diaphragm relaxes, the process reverses and you exhale.

♦ Other Respiratory Movements

- Speech and other vocal sounds
- Coughing and sneezing
- Crying
- Sighing
- Yawning
- Hiccupping
- Laughing

♦ Most respiratory movements release water from your body out to the environment.

♦ Water is lost through sweat, urine, and exhalations of air.