Cellular Respiration

Where else have we heard the word “respiration”?

Storing and Using Energy is like a…

- **BANK!**
  - During photosynthesis, plants capture energy from the Sun and "save" or "deposit" it in the form of carbohydrates
    - Such as glucose, a simple sugar
  - When cells need energy, they "withdraw" it by breaking down these carbohydrates
    - This process releases the energy they need

What is Cellular Respiration?

- The "withdrawal" process of energy
- The process by which cells break down simple food molecules such as glucose to release the energy they contain.
  - Cells break down simple food molecules (glucose) to release the energy they contain
- This energy is used for all of the cell's functions

What Are the Steps of Cellular Respiration?

- Like photosynthesis, a two-stage process
  - **1: Glucose is broken down into smaller molecules**
    - **Occurs in the cytoplasm**
    - **Only a small amount of energy is released here**
  - **2: The smaller molecules are broken down even more**
    - **Occurs in the mitochondria: the cell "powerhouse"**
    - **Chemical reaction that requires oxygen**
    - **Great deal of energy is released here**

Chemically Speaking

- $C_6H_{12}O_6 + O_2 \rightarrow CO_2 + H_2O + energy$

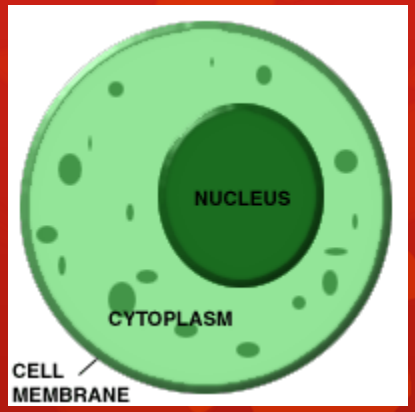
← Write this on your graphic organizer!

- Why does this equation look familiar?

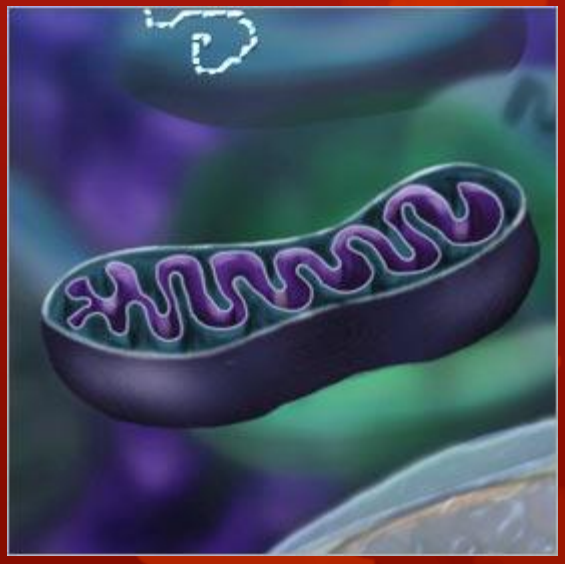
Ingredients and Results

- Raw materials: Glucose + oxygen
- Products: Carbon dioxide + water + energy

Where Does Cellular Respiration Happen?



- Stage 1 occurs in the cytoplasm
- Stage 2 occurs in the mitochondria: the cell powerhouse
- Plants AND animals



Fermentation

- Some cells can obtain energy without oxygen
  - Single-celled organisms that live deep in the ocean or in mud, where there is no oxygen
  - Yeast

Fermentation

- Receive energy through **fermentation**
  - Produces much smaller amounts of energy
  - 2 types of fermentation
    - 1. Alcoholic fermentation: products are carbon dioxide, energy, and alcohol
    - 2. Lactic-acid fermentation: one product is lactic acid
      - This is why athletes feel sore after sprints! Oxygen was used up faster than breathing replaces it.

Photosynthesis vs. Respiration

- These processes can be thought of as opposites!

- Together, these two processes form a cycle that keeps the levels of oxygen and carbon dioxide fairly constant in the atmosphere