Cellular Respiration

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» Cellular respiration is the process in which organisms break down food to create usable energy.

» Chemical energy in food is converted into mechanical and thermal energy in the living organism.

The Chemical Formula of Cellular Respiration

Cellular Respiration

$$C_6H_{12}O_6 + 6 O_2 \longrightarrow 6 CO_2 + 6 H_2O + Energy$$

» Glucose + 6 molecules of oxygen produce 6 molecules of carbon dioxide + 6 molecules of water + mechanical and thermal energy.

Where does cellular respiration occur?

» Cellular respiration occurs within **every** <u>cell</u> of **every** <u>living</u> organism.

» It occurs within the **<u>mitochondria</u>** of each cell.

What is the energy from cellular respiration used for?

1. Movement
2. Growth
3. Development
4. Reproduction
5. Warmth

Energy Conversions

» Which types of energy are <u>converted</u> from the <u>sun</u> to a <u>person moving</u>?

» **<u>Radiant/Solar/Light</u>** (light from <u>sun</u>)

» **<u>Chemical</u>** (<u>glucose</u> stored in plant through photosynthesis, cellular respiration & <u>digestion</u> in animal)

» **<u>Mechanical</u>** (organism breaks down glucose to produce energy to <u>move</u> and grow)

» **<u>Thermal</u>** (<u>heat</u> is released in the atmosphere)

The Oxygen Cycle

» Photosynthesis and Cellular Respiration are complimentary <u>reactions</u> that result in the <u>oxygen</u> cycle.

» The <u>products</u> of **photosynthesis** are the <u>reactants</u> of **cellular respiration** and the <u>products</u> of **cellular respiration** are the <u>reactants</u> of photosynthesis.
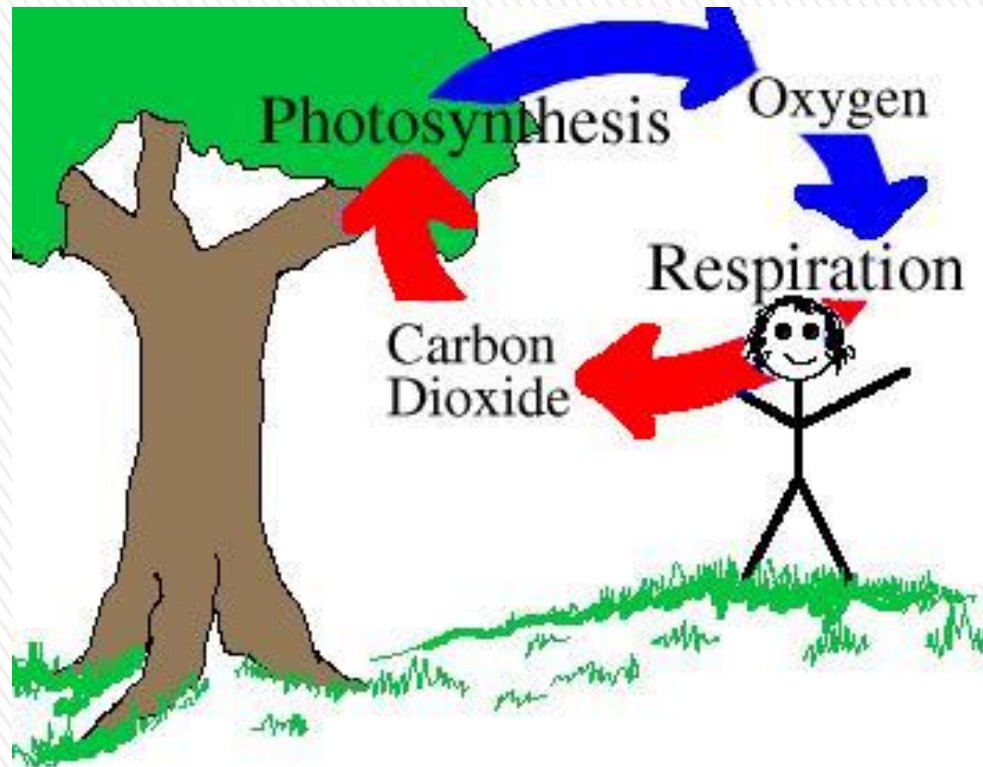
Photosynthesis vs. Respiration

» **Reaction:** $6CO_2 + 6H_2O + light \rightarrow C_6H_{12}O_6 + 6O_2$ $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + energy$

» **Reactants:** Carbon dioxide, water, sun   Glucose, oxygen

» **Products:** Glucose   Energy

» **Waste products:** Oxygen   Carbon dioxide, water

» **Energy needs:** Requires energy   Releases energy

» **Summary:** Sugar synthesized using   Energy released from
energy from the sun   sugar breakdown