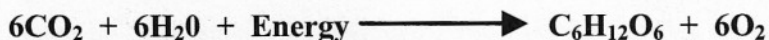


## PHOTOSYNTHESIS

Photosynthesis is the process by which plants use  $CO_2$ , water, and the sun's energy to make glucose and oxygen. The balanced equation for photosynthesis is:



### Overview:

- Build the reactants in the photosynthesis equation.
- Where in a plant cell does photosynthesis occur? Be specific.
- Name the primary light trapping pigment responsible for photosynthesis. Are there other pigments?
- What is the role of water in photosynthesis.
- The energy given off by the sun makes up the electromagnetic spectrum. Name the types of energy in the electromagnetic spectrum from the lowest to the highest energy. Discuss their wavelengths.
- List the colors of visible light from lowest to highest energy & describe their wavelengths.
- What is the "energy" supplied in the reaction?

### Light Dependent Reactions

- Create a large color drawing of a thylakoid disc. Include:
  - Phospholipid bilayer
  - Chlorophyll molecule
  - Transmembrane enzymes
  - Proton pump
  - Water molecule
  - Hydrogen ions
  - $ADP \longrightarrow ATP$
  - $NADP^+ \longrightarrow NADPH$
  - Photon of light energy
  - Excited electron
  - Chemiosmosis
- Write a paragraph using the terms above to explain how the sun's energy is converted to the high energy biological molecules ATP and NADPH.

### Light Independent Reactions (Calvin Cycle)



- Convert the reactants into a glucose molecule and oxygen molecules.
- Diagram the Calvin Cycle and label the following terms:
  - $CO_2$
  - Glucose
  - $NADPH \longrightarrow NADP^+$
  - $ATP \longrightarrow ADP$
  - Pyruvate
- Describe the events of the Calvin Cycle using the terms above.
- Explain the terms "Light Dependent Reactions" and "Light Independent Reactions". Are these suitable terms? Why or why not?

# RESPIRATION

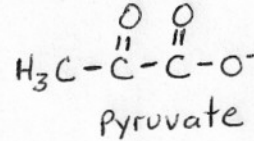
*Aerobic respiration is the process by which cells break down glucose in the presence of oxygen to produce ATP, CO<sub>2</sub>, and H<sub>2</sub>O.*



## Glycolysis:

*Glycolysis occurs in the cytoplasm and consists of ten reactions that convert glucose into two pyruvate molecules. Two molecules of water, two NADH, and two ATPs are produced.*

- Break glucose down into two pyruvates.
- Where do the leftover hydrogens end up?
- What is the "energy" produced in the reaction?



## Krebs Cycle:

*The pyruvates from glycolysis are broken down over nine sequential reactions that extract energetic electrons and make ATP, NADH, and FADH<sub>2</sub> (high energy molecules). The electron transport chain will use these high-energy molecules to make more ATP.*

- Rearrange the pyruvates and hydrogens to make the final products of respiration.
- Draw and color the following diagram depicting the relationship between photosynthesis and respiration in plants. Label the following terms in the appropriate spaces: chloroplast, mitochondrion, sunlight, heat, Krebs cycle, glucose, CO<sub>2</sub>, electron transport chain, O<sub>2</sub>, pyruvate, H<sub>2</sub>O, ATP, Photosystem I, Photosystem II

