

ATP: CELLULAR ENERGY

Produced by cellular respiration

ALL CELLS NEED ENERGY!!!! What do they need energy for?
MUSCLES, BREATHING, THINKING, CELL DIVISION, ACTIVE TRANSPORT, MOVEMENT, MAKING PROTEINS, HEART PUMPING

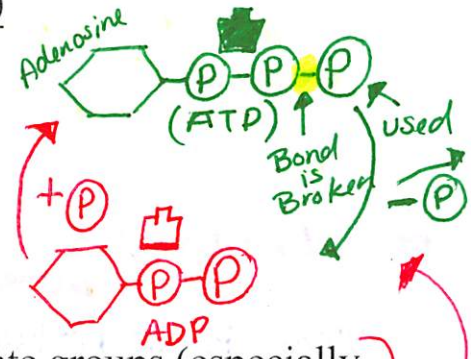
ATP GIVES YOUR CELLS THE ENERGY THEY NEED

ATP = adenosine triphosphate (Like a full Battery)

ADP = adenosine diphosphate (Like a low/dead Battery)



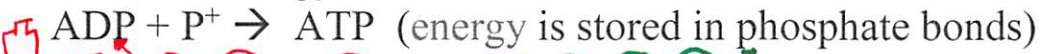
- *adenosine molecule with 3 phosphate groups attached
- adenosine molecule with 2 phosphate groups attached



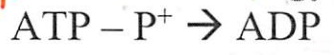
ATP = a quick source of energy

- the energy is stored in the bonds between the phosphate groups (especially the 2nd and 3rd)
- like magnets, the phosphate groups take effort to push together; they are storing all that energy in their bonds
- when those phosphate bonds are broken, BAM! Your cells get energy
- when one phosphate group is broken off ATP (3) becomes ADP (2)

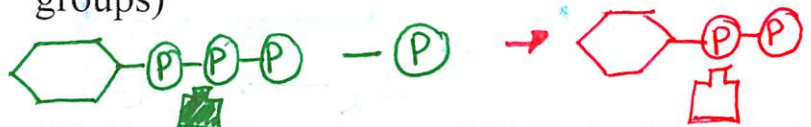
*To store energy:



*To release energy:

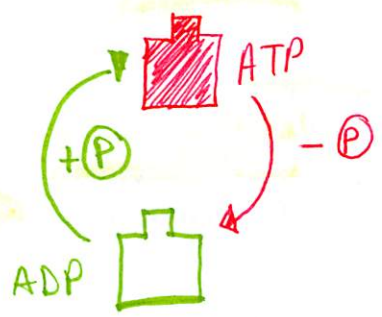


(energy is released from phosphate bonds, especially between 2nd and 3rd phosphate groups)



Cells use the process of Cellular Respiration to make ATP ← ATP is made in the mitochondria.

glucose + oxygen are combined to make ATP!



PHOTOSYNTHESIS NOTES:

Is the opposite of Cellular Respiration!

LINK #1: BORN IN THE SUN

- * Photo = light synthesis = assemble/put together
- * Photosynthesis = putting together light to make sugar (glucose)

WHO? Plants, Algae, Bacteria (Producers!) → Autotroph

Autotroph: organism that makes its own energy (self-feeding)

Auto = self troph = feeding

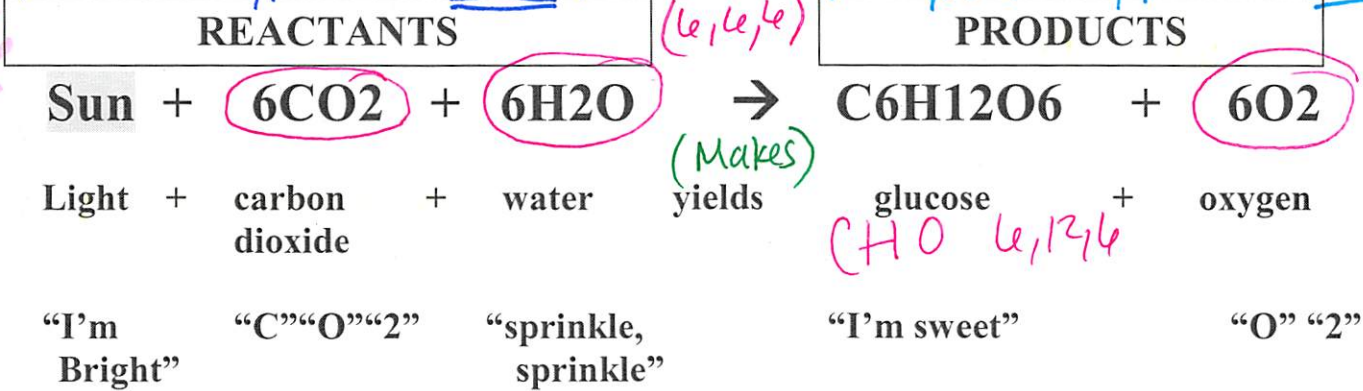
AUTOTROPHS are also called **PRODUCERS**

WHAT? Photosynthesis is converting energy from the sun (light energy) into chemical energy in the form of carbohydrates (sugar: glucose)

what plants/producers need!

Devils # (6, 6, 6)

what your plants/producers make!



WHEN? 2 STAGES

1st: Light reactions/Light Dependent (requires light) ← Only Happens during the Day!

to remove hydrogen

* Hydrolysis takes place: water (H₂O) broken into O₂ H₂O - H = O₂

* takes place in the thylakoid membranes (part that looks like "coins")

2nd: Dark reactions/Light Independent (doesn't require light) also called CALVIN CYCLE

Always happens

* CO₂ (carbon dioxide) is broken apart into C₆H₁₂O₆ (glucose)



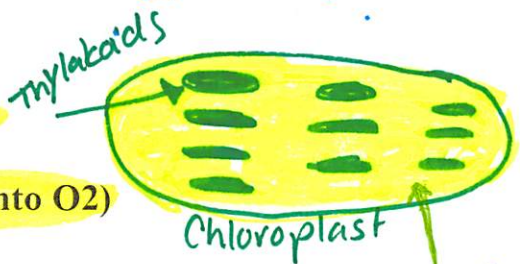
WHERE? There are 2 main parts of the chloroplast

Green

1. **Thylakoids** = they look like stacks of coins or pancakes

* the light reactions take place here

* Hydrolysis takes place here (water broken apart into O₂)



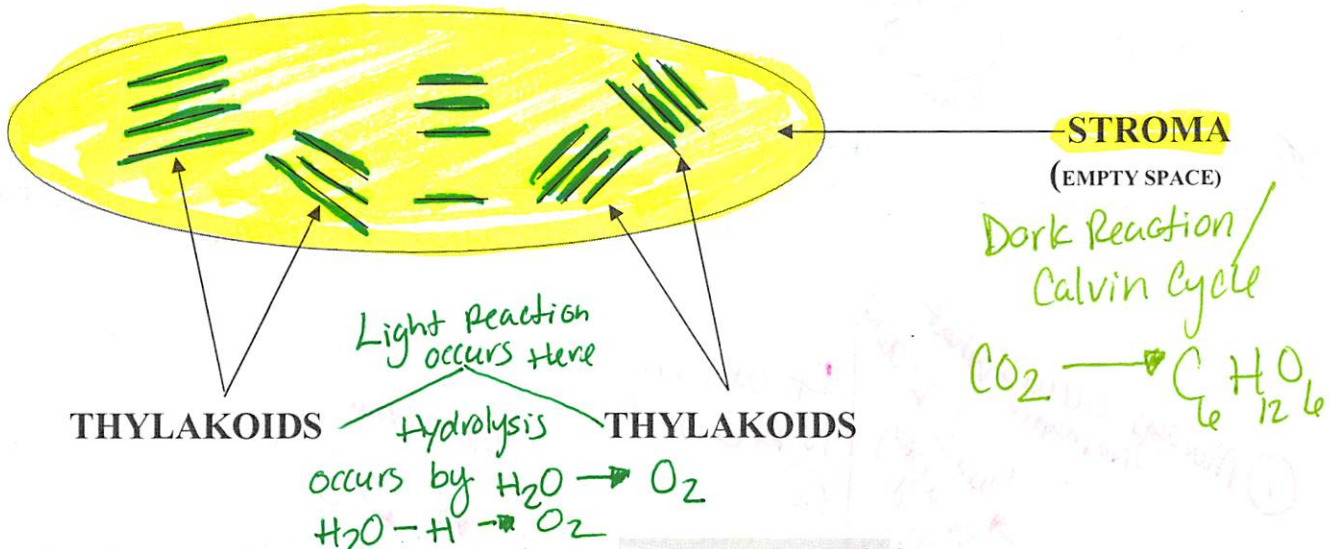
2. **Stroma**

* Space around the thylakoids (like syrup on a stack of pancakes)

* Dark reactions take place here

* Carbon dioxide (CO₂) is turned into Glucose (C₆H₁₂O₆)

CHLOROPLAST (traps sun's energy with chlorophyll)



WHY? Why do plants, algae and bacteria do Photosynthesis?

1. To make Glucose (food/sugar)

- * the glucose feeds Heterotrophs (organisms, like us, that can't do photosynthesis)
- * autotrophs are producers, heterotrophs are consumers

2. To produce Oxygen

CELLULAR RESPIRATION NOTES → Occurs in the Mitochondria

Producers make glucose by doing **PHOTOSYNTHESIS**

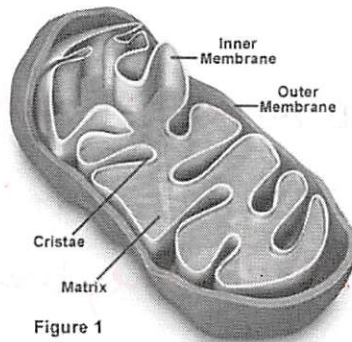
Glucose must be turned into ATP (energy for the cell) by doing **CELLULAR RESPIRATION**

ALL ORGANISMS (EVEN PLANTS) DO CELLULAR RESPIRATION!!

CELLULAR RESPIRATION: process in which mitochondria break down food molecules to produce **ATP (energy)**

- * Occurs in **3** stages (glycolysis, citric acid cycle, electron transport chain)
- * cells that use a lot of energy have a lot of mitochondria (Powerhouse of the cell)
- * example: muscle cells have a lot of mitochondria

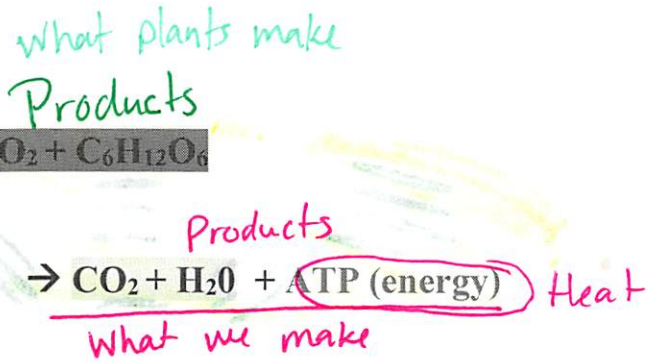
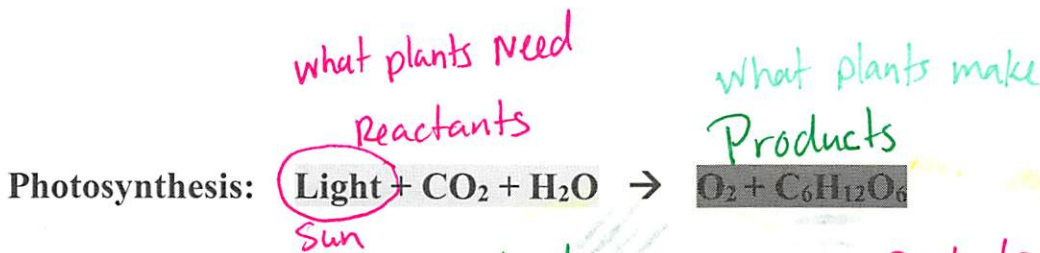
Mitochondria Inner Structure



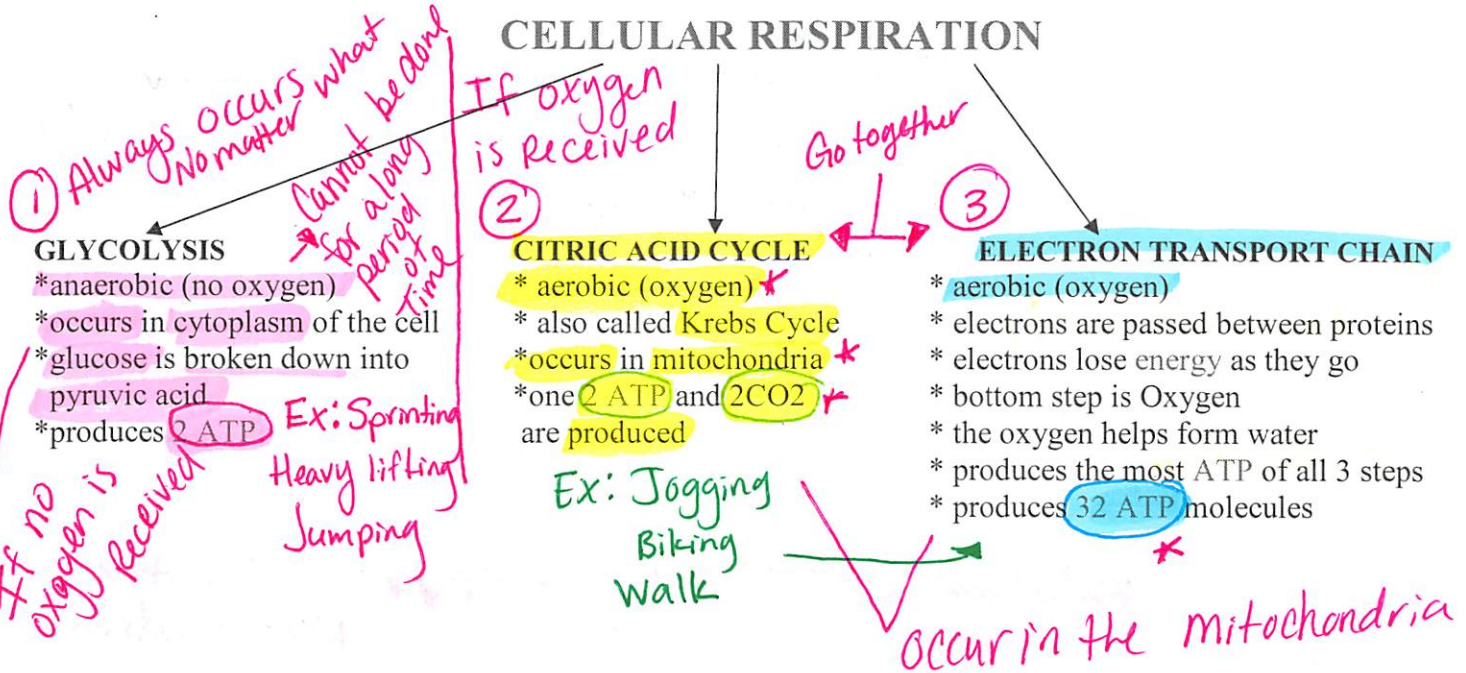
Glucose + oxygen are combined to make **ATP** in the **Mitochondria**.

Cellular respiration is the opposite of photosynthesis

* reactants/products switch places



CELLULAR RESPIRATION



What happens if Oxygen is not present after glycolysis?

* Anaerobic (without oxygen) Respiration called Fermentation occurs

* 2 different types of Fermentation

1) Lactic Acid Fermentation

- * supplies energy when oxygen is not available, such as when doing heavy exercise
- * results in 2 ATP molecules
- * makes muscles tired
- * lactic acid in your muscles

2) Alcoholic Fermentation

← We do not go through this!

- * used by yeast and some types of bacteria
- * produces ethyl alcohol and CO₂
- * when yeast gives off CO₂ that is what causes the bread to rise and have bubbles in the middle

• How yogurt, sour cream, Bread, wine, beer is made.

• How we make bread (using yeast)