

# KEYSTONE REVIEW SESSION #3

Photosynthesis  
Cell Respiration

## ENERGETICS

- Keystone Standards:
- BIO.A.3.1.1 Describe the fundamental roles of plastids (e.g., chloroplasts) and mitochondria in energy transformations.
- BIO.A.3.2.1 Compare the basic transformation of energy during photosynthesis and cellular respiration.
- BIO.A.3.2.2 Describe the role of ATP in biochemical reactions.

## PHOTOSYNTHESIS

- the process by which light energy is converted to chemical energy then to organic compounds (FOOD!)

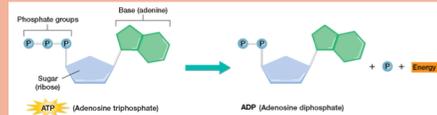
Two Conversions of Energy:

In the light reaction in the thylakoids- light energy is converted to chemical energy

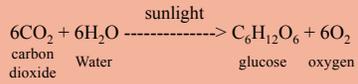
In the stroma of the chloroplast- chemical energy is converted to organic compounds (food such as sugar)

## ATP- STORED MOLECULE OF ENERGY

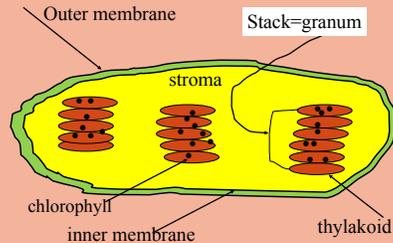
- If the question asks "blah blah blah.... Energy" the answer is almost always ATP- you will get one of these
- ATP= adenosine tri phosphate- the most energy
- ADP= Adenosine Diphosphate which is ATP LESS one phosphate
- AMP= adenosine mono phosphate Less energy than di



### PHOTOSYNTHESIS EQUATION



### CHLOROPLAST SKETCH



### BREAKING DOWN PHOTOSYNTHESIS

**Light reaction**

- A. Water is split; Pigments inside thylakoid absorb sunlight to make ATP\* and NADPH\* for use later in the dark reactions.

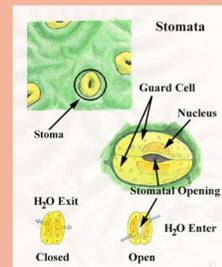
\* indicates Chemical ENERGY

**Light Independent/Dark Reaction/Calvin Cycle, light is optional**

- A. Uses chemical energy from NADPH and ATP to fix carbon into organic compounds-sugar
- B. Since the reactions are tied, it is a coupled reaction
- C. occur in the stroma inside the chloroplast

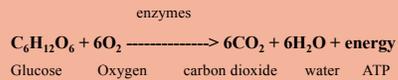
### STOMATA ARE IMPORTANT

- Pore/opening typically found on the bottom of a leaf
- Important to move O<sub>2</sub> out and CO<sub>2</sub> into the cell and to release H<sub>2</sub>O vapor.
- Surrounded by guard cells that fill with water in response to the environment



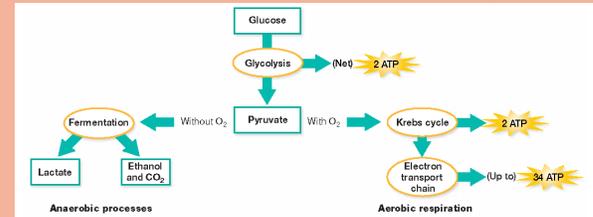
## CELL RESPIRATION

- The process cells use to take the energy from food and use it to power the cell. Food energy becomes ATP
- When the Keystone talks about cell respiration, they generally discussing AEROBIC cell respiration



## GLYCOLYSIS

- The breakdown of glucose- both aerobic respiration AND fermentation begin with the breakdown of glucose

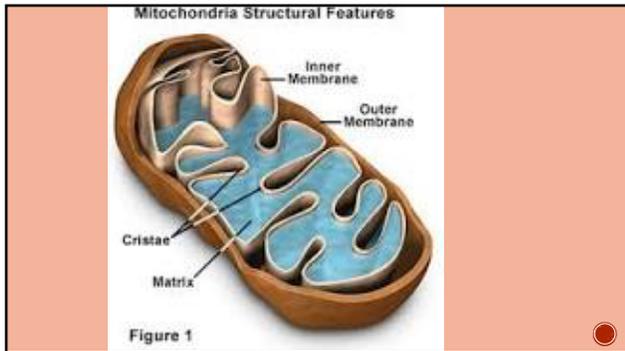


## FERMENTATION- NO AIR NEEDED

- Two types –
- lactic acid (humans and animals do this)
- Alcoholic fermentation (yeast, bacteria, plants)

## AEROBIC CELLULAR RESPIRATION

- In eukaryotes- it happens in the mitochondrion, but in prokaryotes it happens in the cytosol (cytoplasm) because they don't have mitochondria
- Glucose is too big for the mitochondrion so... glycolysis produces a smaller 3 carbon molecule first, then it slides into the mitochondrion where it will find oxygen to complete cell respiration



## CELL RESPIRATION

. Step 1. Kreb's cycle aka Citric Acid Cycle- happens in the mitochondrial matrix, electron carriers are produced that will be used in the next step  
 Step 2- Electron Transport Chain- this happens in the inner mitochondrial membrane. Oxygen is needed, those electron carriers from Krebs produce MANY ATP, used for cell processes

## WHAT'S MORE EFFICIENT?

. Aerobic respiration is more efficient because it produces up to 38 ATP compared with 2 ATP from anaerobic respiration (fermentation)

## VIDEO REVIEW

- Amoeba sisters photosynthesis
- Hank Green Photosynthesis
- Cellular Respiration- Amoeba Sisters
- Illuminating Photosynthesis activity
- <http://tinyurl.com/17011plants>