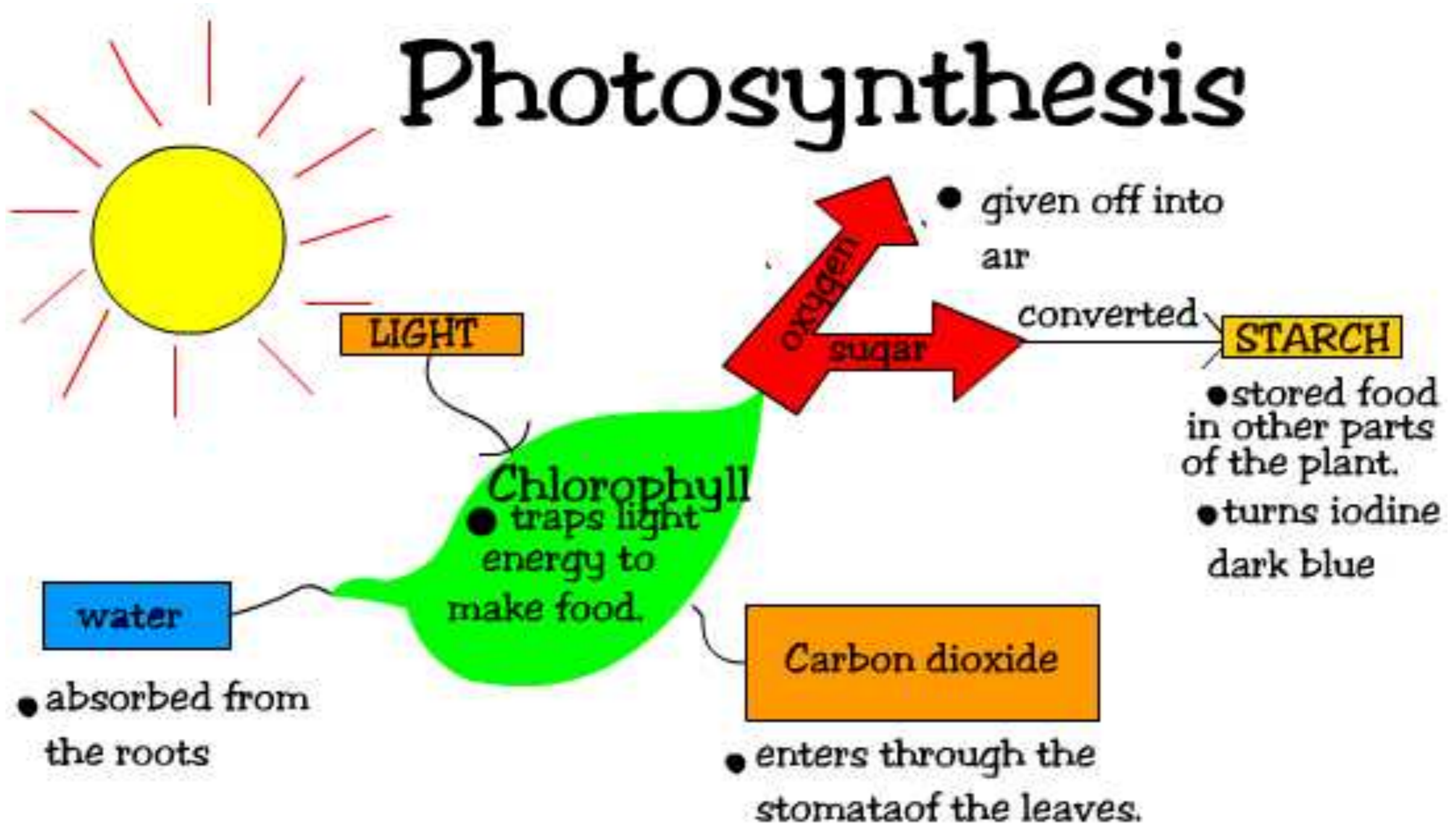


# Lecture #34- PART C

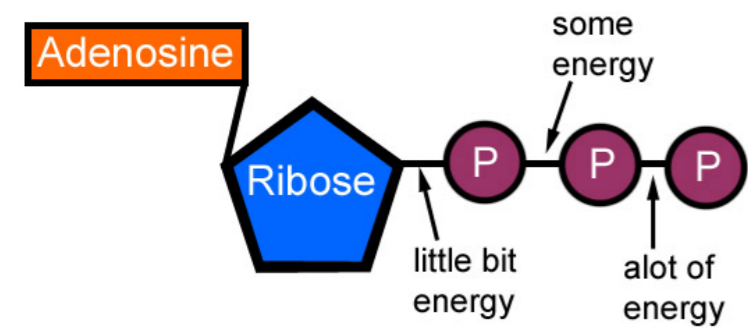
## Ms. Day

### Honors Biology

# Photosynthesis



# Calvin Cycle

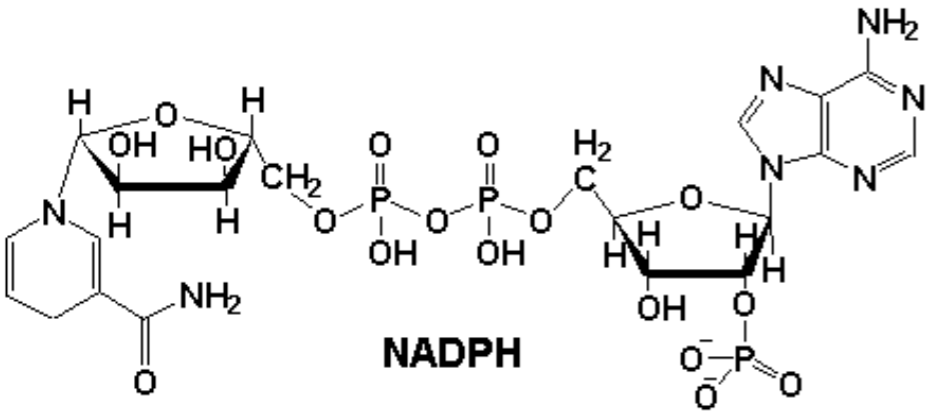


+

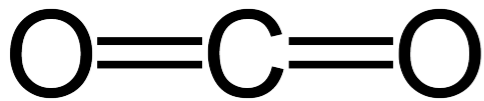
**Makes**

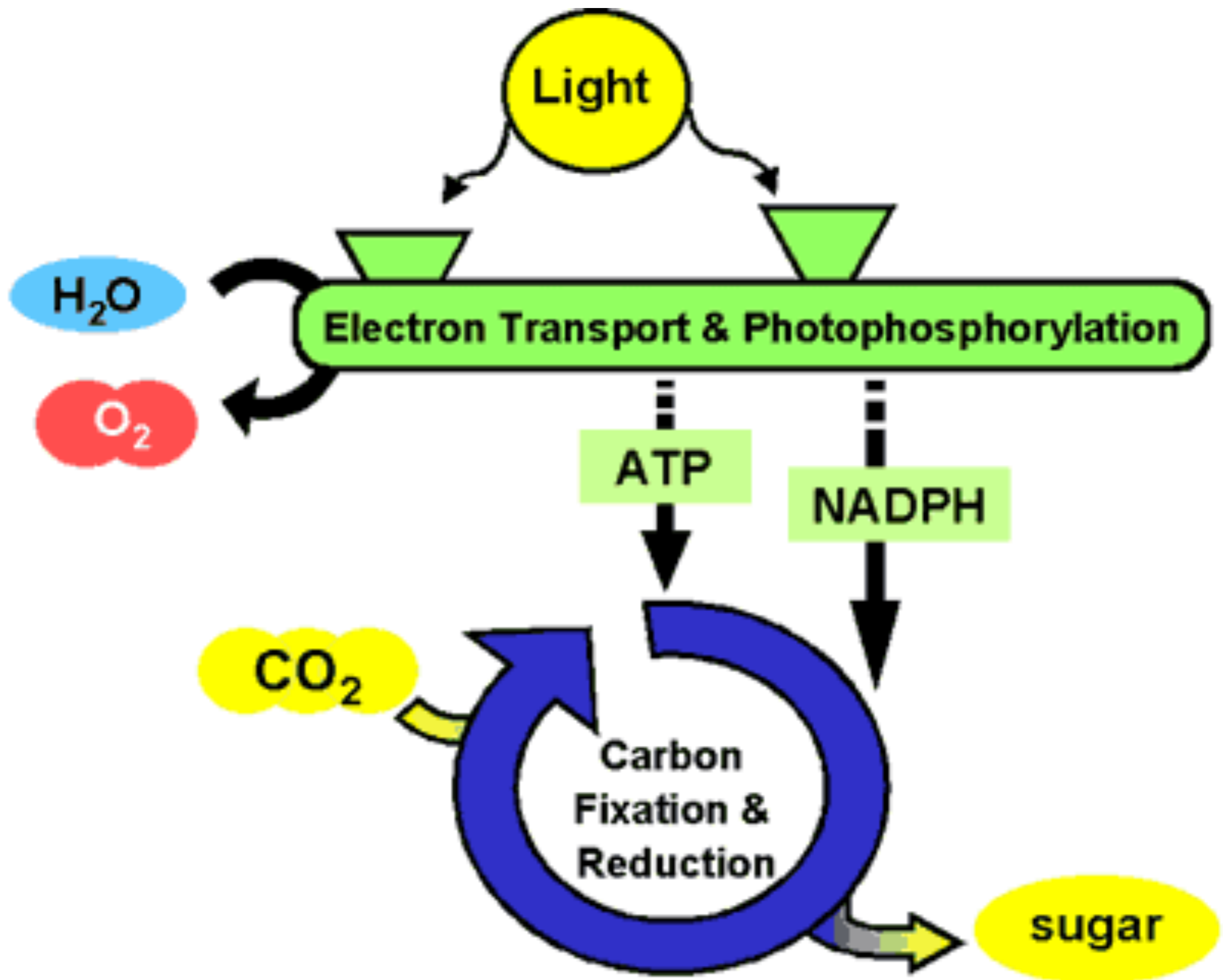


**Into**



+

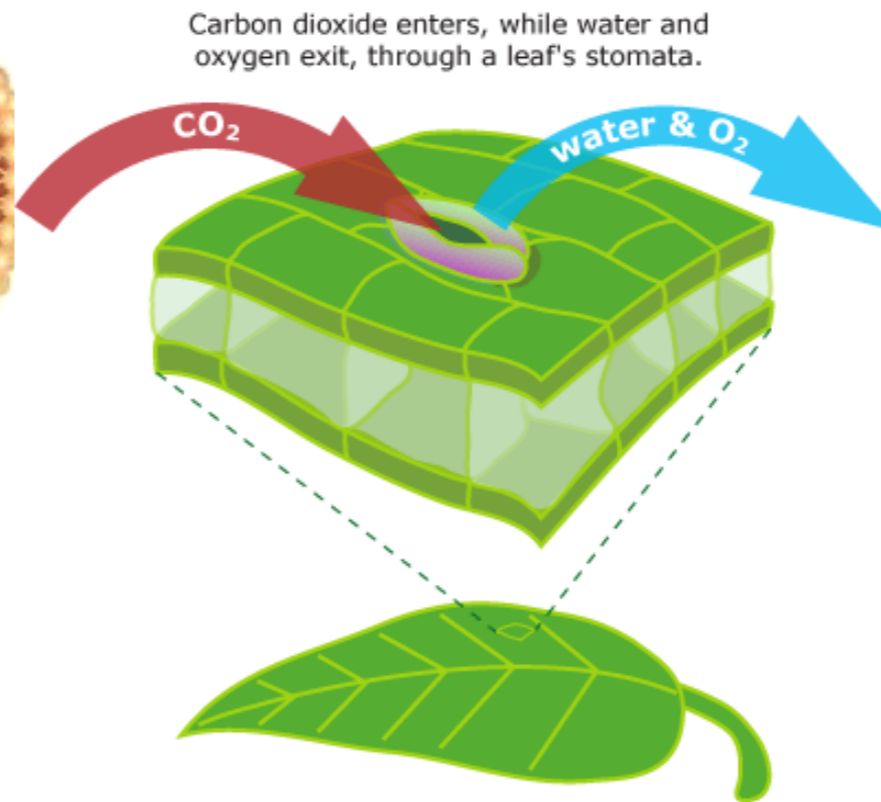
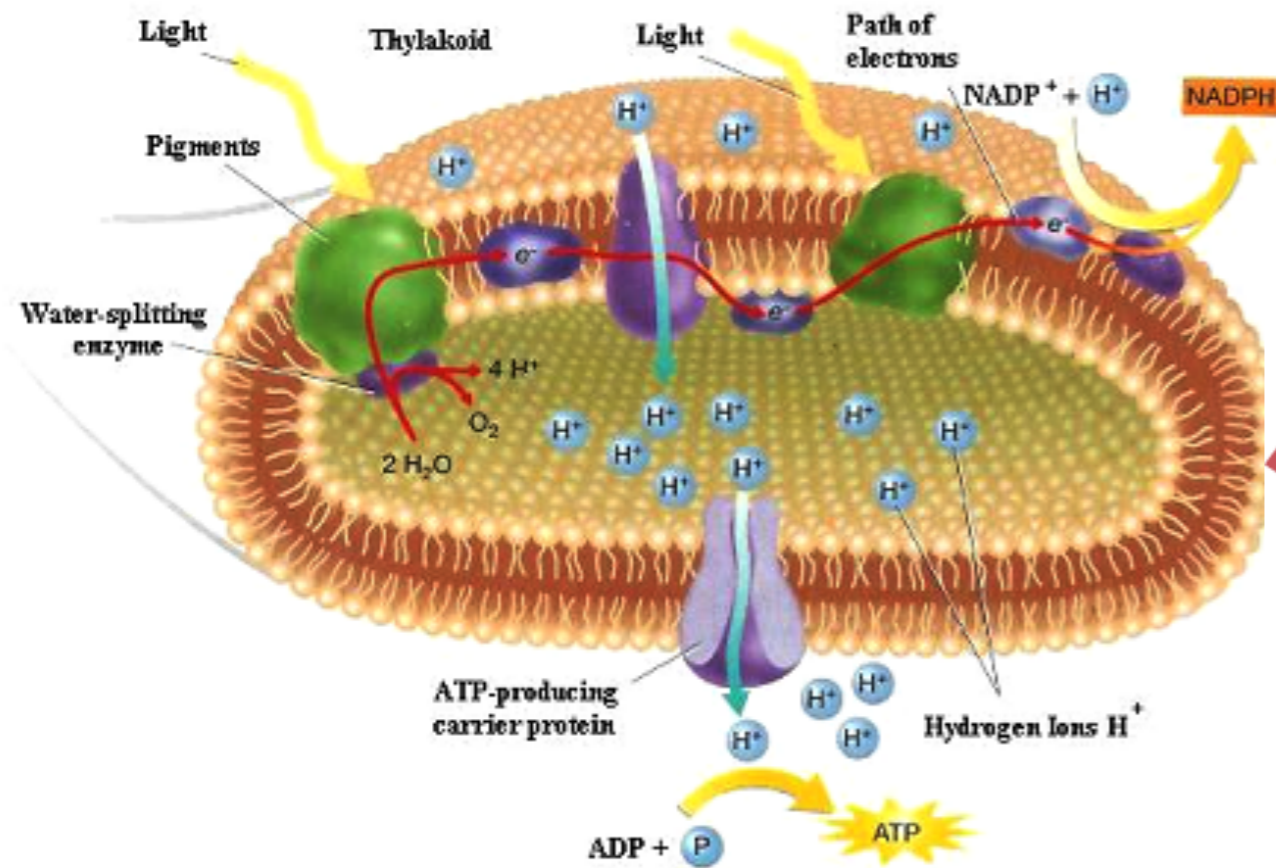






# Fuel for the Cycle

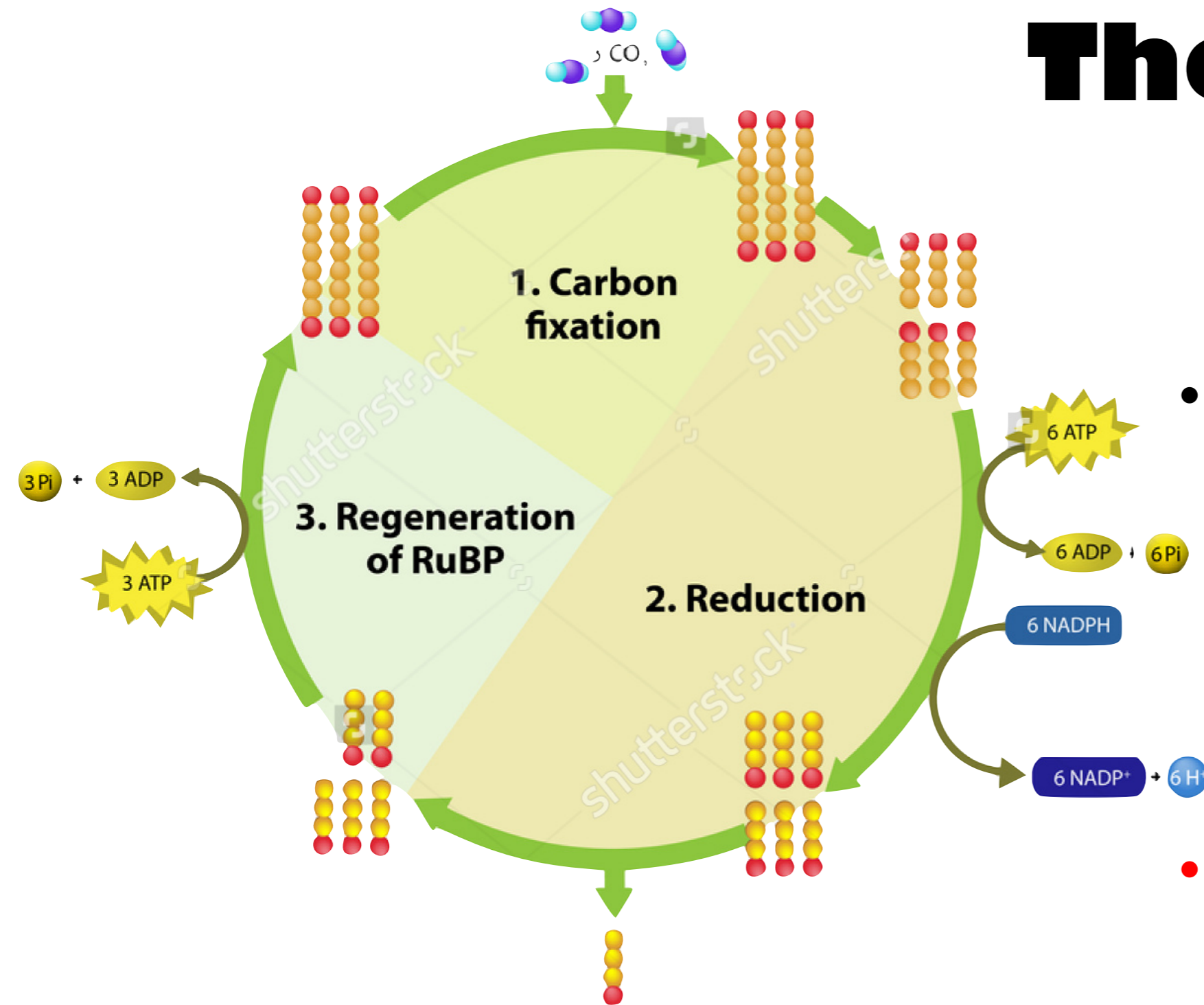
NADPH provides electrons to make sugar from  $\text{CO}_2$



ATP provides energy to make/break bonds in Calvin cycle

$\text{CO}_2$  is brought into plant from atmosphere through tiny “holes” on leaves called **stomata**

# The Calvin Cycle



- **A repeating series of chemical reactions completed by enzymes**
- **Occurs in the stroma**

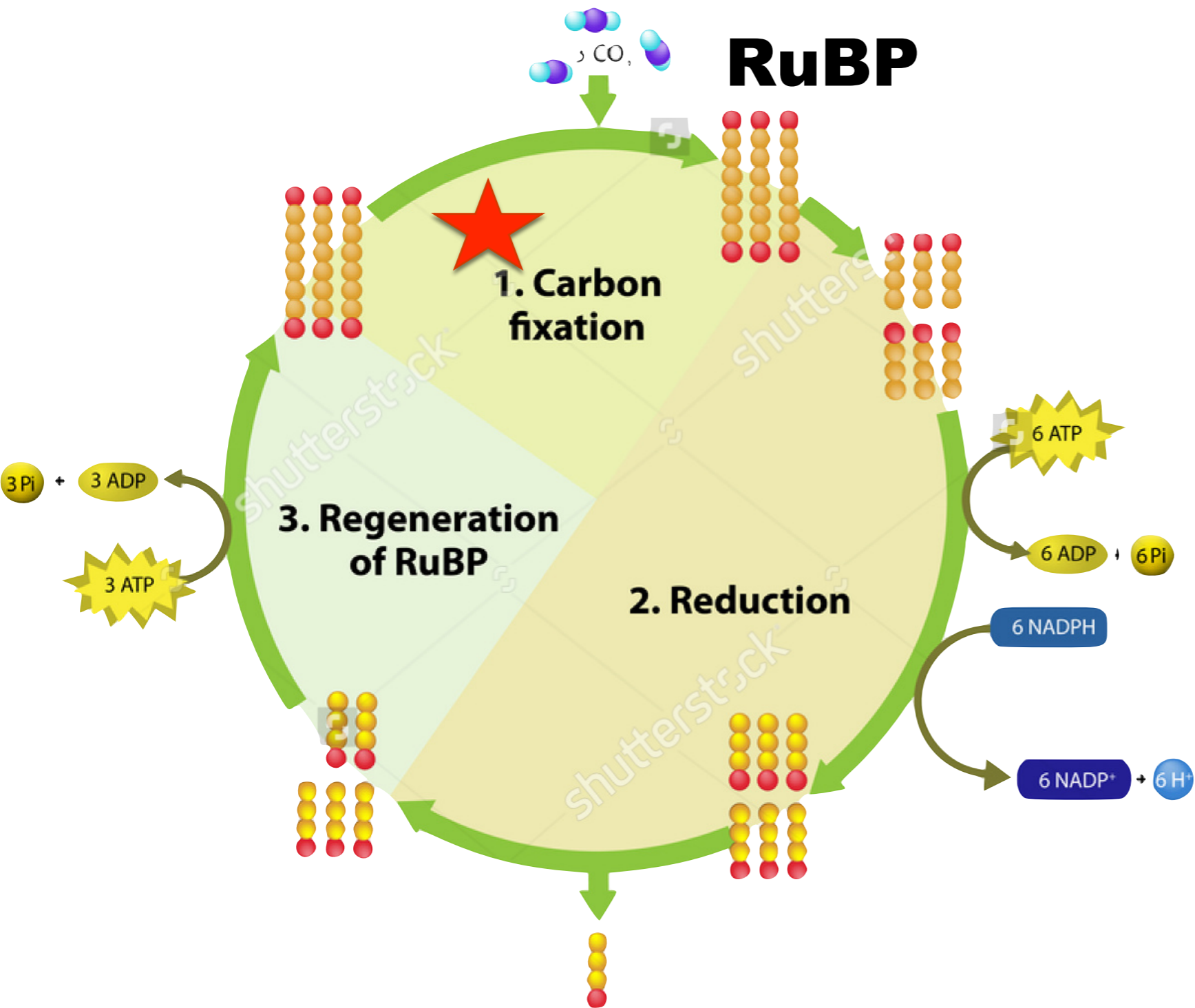
- **require ATP and NADPH from light reactions**

# **The Calvin cycle has three phases**

**1. Carbon fixation**

**2. Reduction**

**3. Regeneration of the CO<sub>2</sub>  
acceptor (RuBP)**



- **RuBP (5 carbon molecule) grabs  $\text{CO}_2$  from air and binds it**
- **Carbon from air is “fixed” into RuBP**
- **$\text{RuBP} + \text{CO}_2 = 6$  carbon molecule**
- **BUT...this 6C molecule immediately splits in  $\frac{1}{2}$  in 2 3 carbon molecules**

# Step # 1 : Carbon Fixation



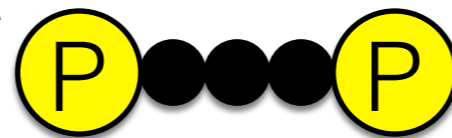
# Step # 2: Reduction



ATP

ADP

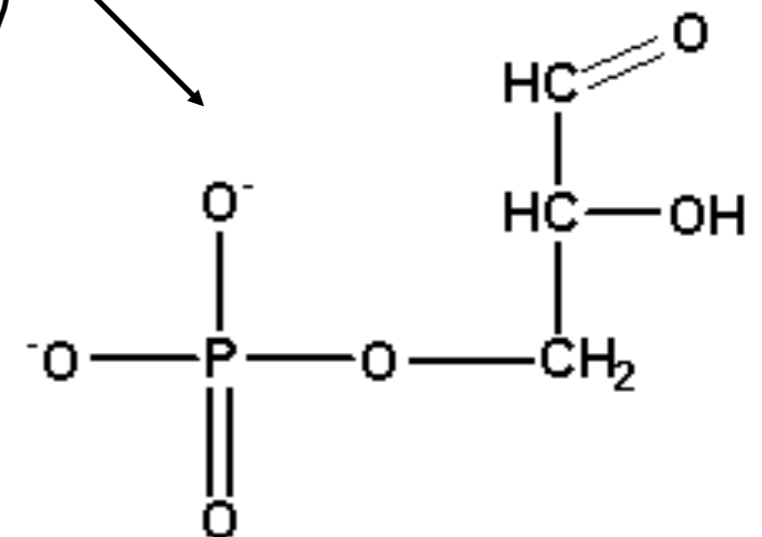
**Reduction means to receive  
(gain or add) electrons**



NADPH

NADP<sup>+</sup>

P



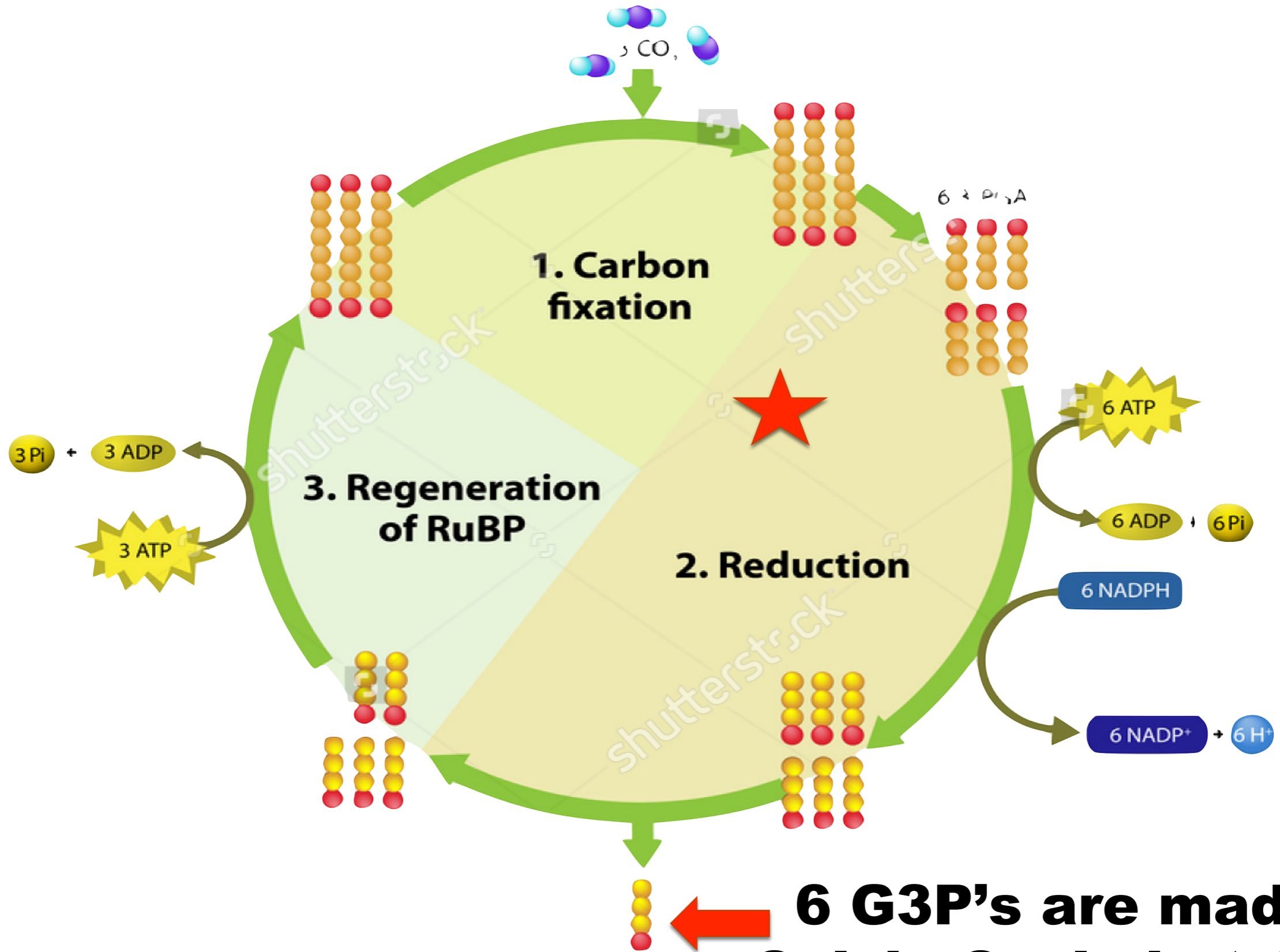
**Glyceraldehyde-3-phosphate**

**ATP and NADPH USED  
to rearrange the 3-  
carbon molecule into  
G3P, a simple 3-carbon  
sugar**

**All molecules have 3 C**



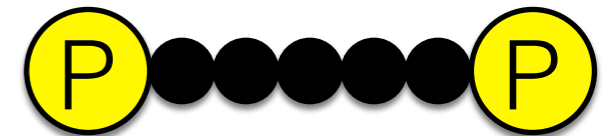
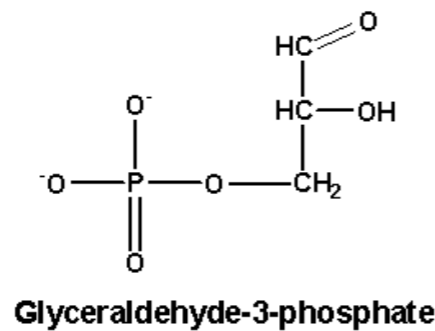
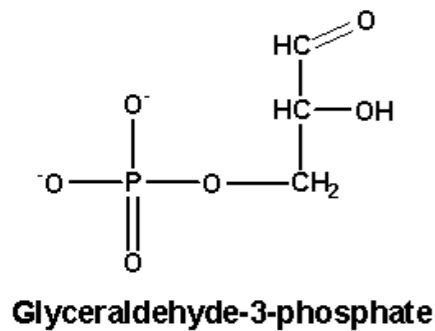
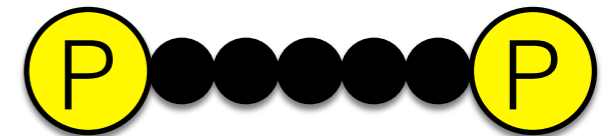
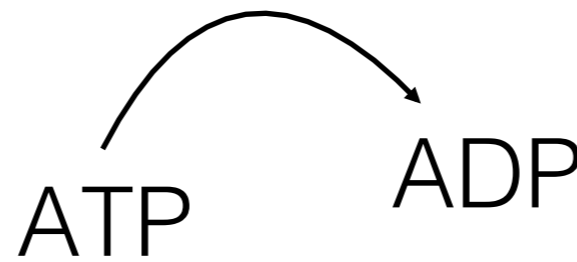
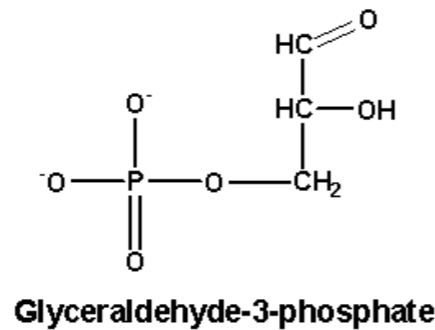
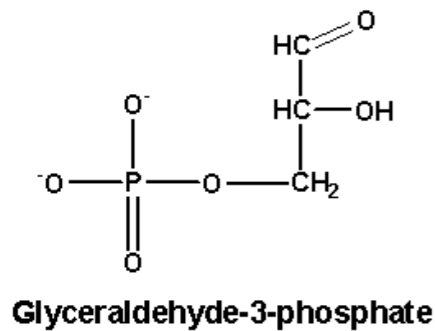
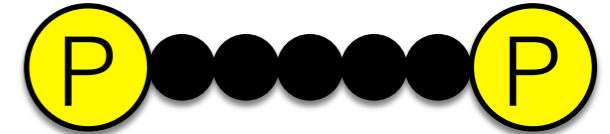
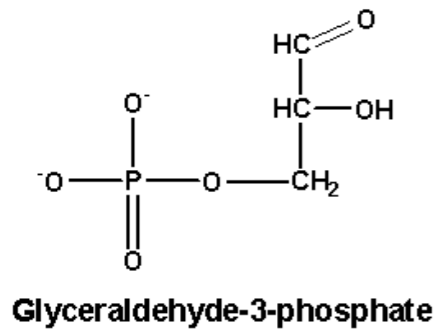
# Step # 2: Reduction



**6 G3P's are made in Calvin Cycle but 1 G3P comes OUT of cycle**

# Step 3: Regeneration

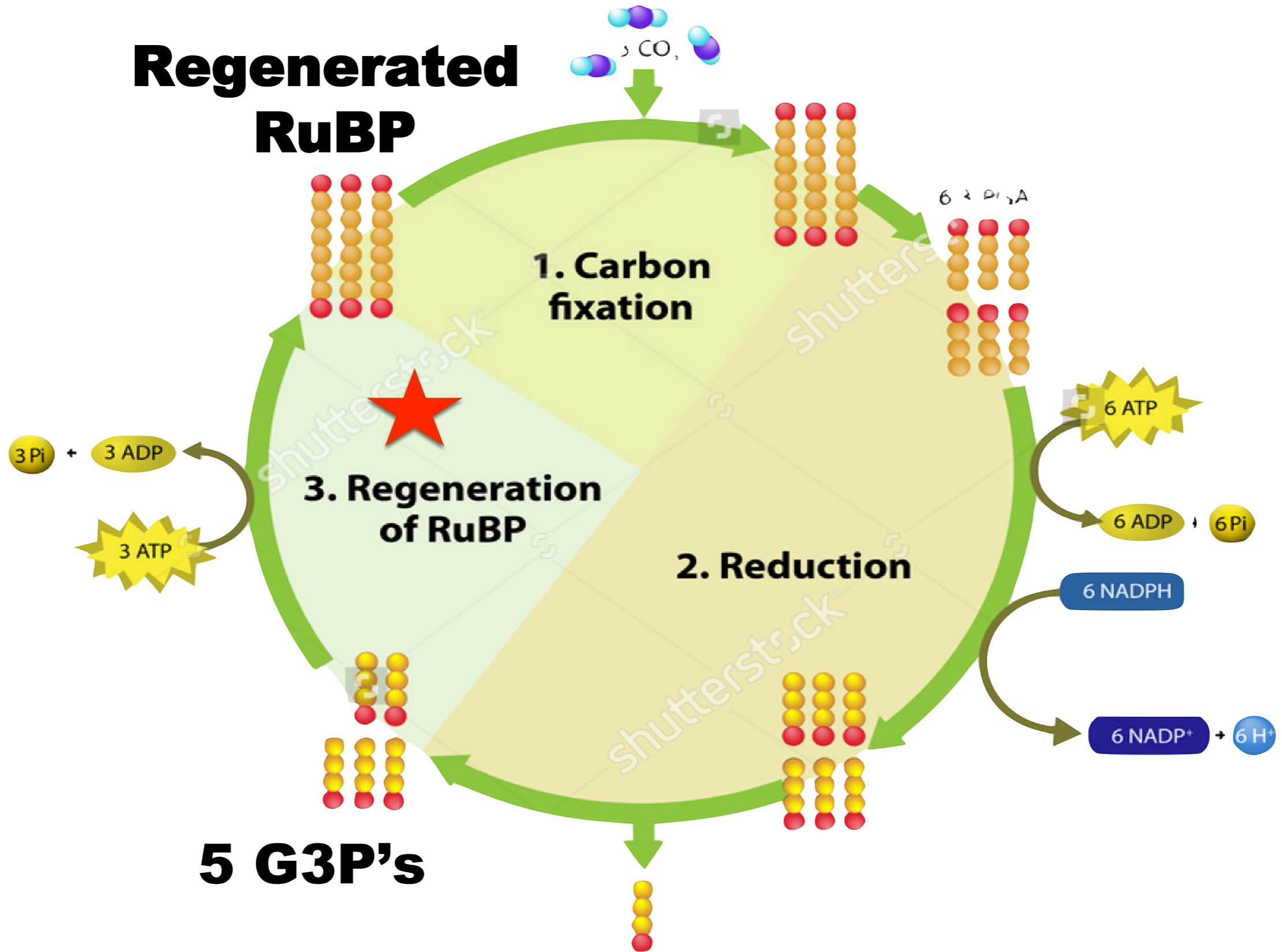
**Need to rebuild the 5-carbon molecule that accepted CO<sub>2</sub> out of G3P**



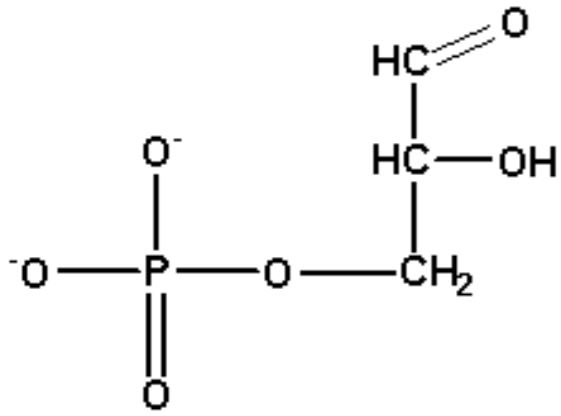
**You need to rearrange 5 G3P to make 3 of the 5-carbon acceptors using more ATP**

**5 3-carbon = 3 5-carbon**

# Step # 3: Regeneration



# The Fate of G3P



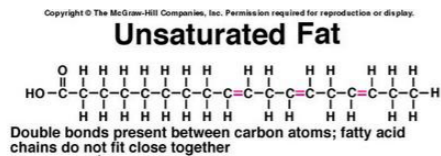
Glyceraldehyde-3-phosphate

Metabolism

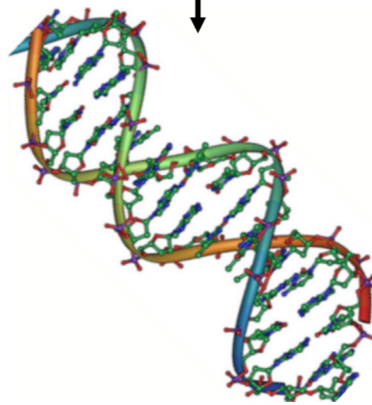
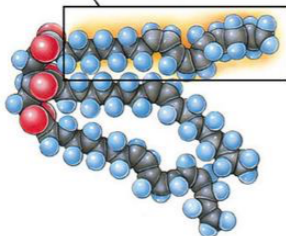
=



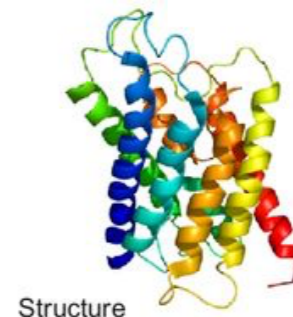
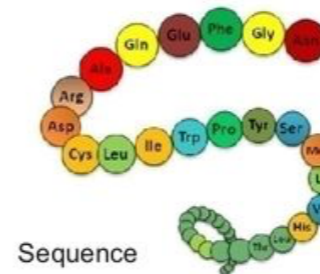
Carbohydrates



Lipids



Nucleic Acids



Proteins

