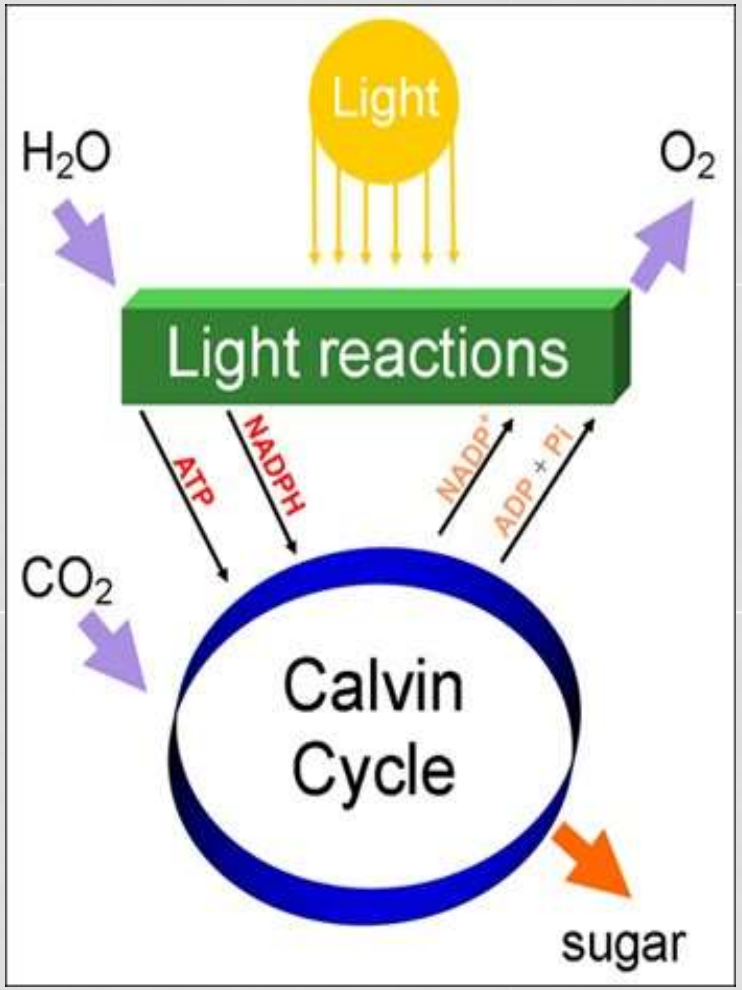
CHAPTER 6: PHOTOSYNTHESIS

CAPTURING & CONVERTING ENERGY

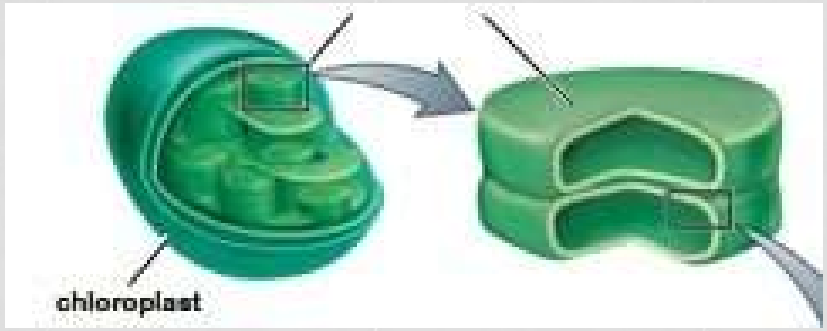
2 PROCESSES OF PHOTOSYNTHESIS

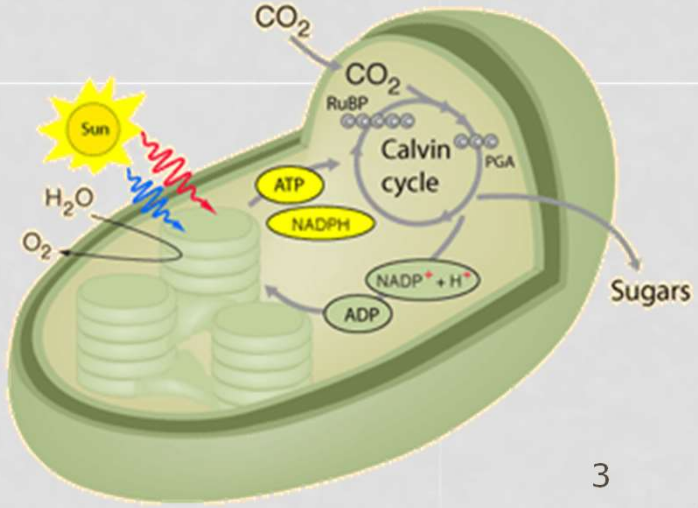
- Photosynthesis is actually 2 processes:
  - **light reactions** - convert solar energy (sunlight) to chemical energy (ATP & NADPH)
  - **dark reactions (Calvin cycle)** - light independent reactions; use energy produced & stored during light reactions (ATP & NADPH) & incorporates CO_2 from air into organic molecules which are converted to sugar (glucose)

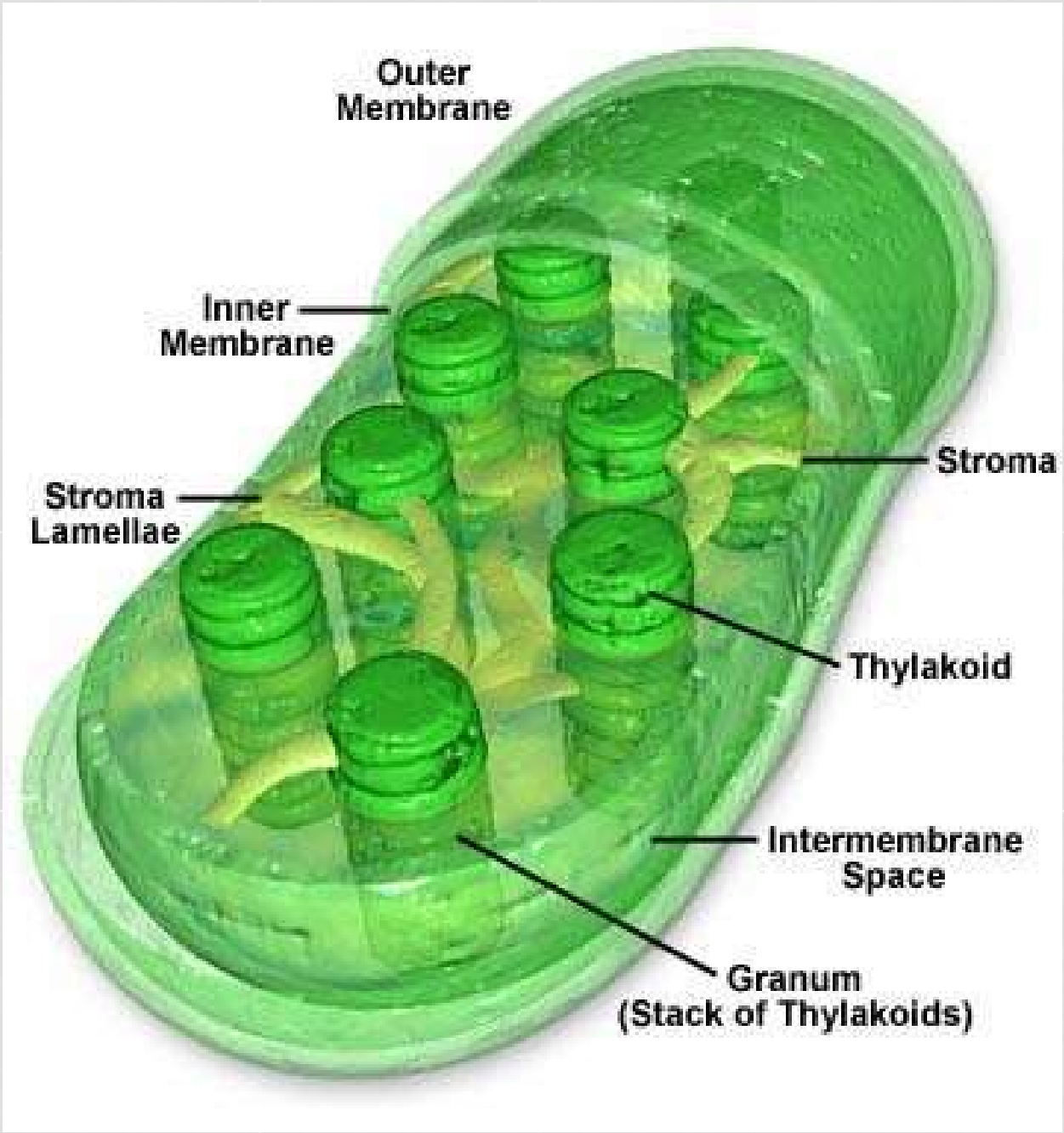


PHOTOSYNTHESIS

- Photosynthesis takes place in **chloroplast** organelle.
  - contains photosynthetic membranes that contain chlorophyll
    - light reactions take place in **photosynthetic membranes (thylakoids)**
    - dark reactions take place **outside photosynthetic membranes (stroma)**

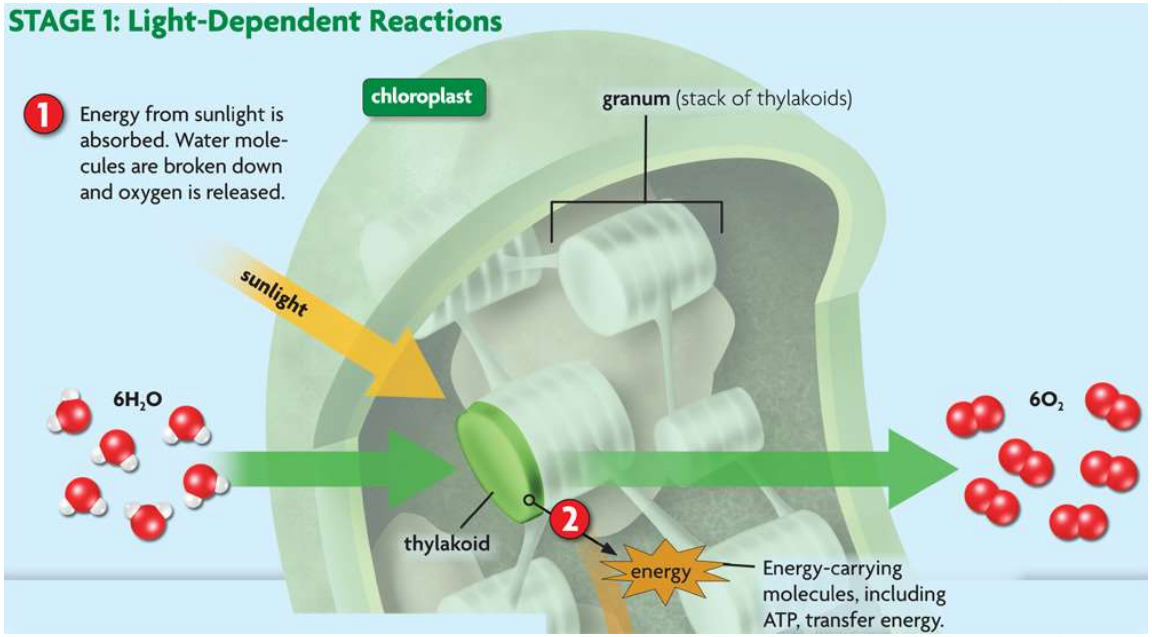






Stage 1: Light-Dependent reactions, sunlight & water are absorbed by chlorophyll in the thylakoids & converted into chemical energy (in the form ATP and NADPH).

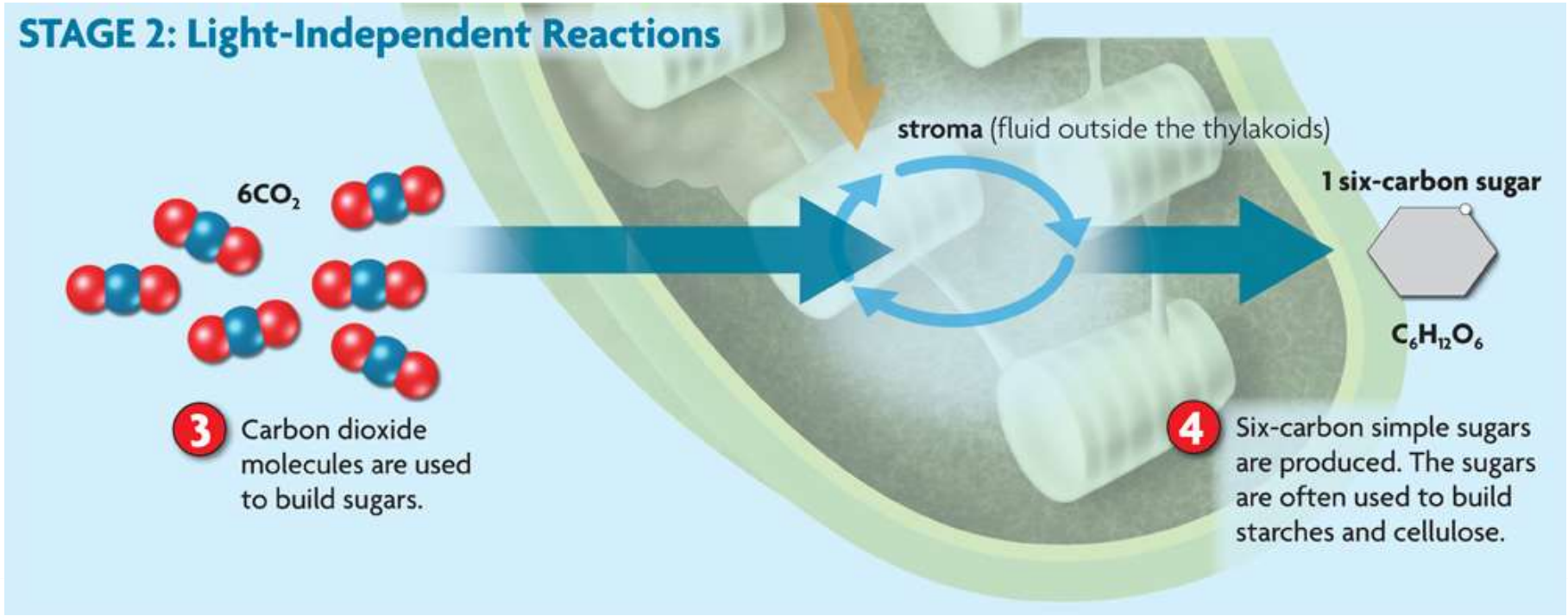
What Goes In? (needed)	What Goes Out? (produced)
Sunlight	ATP, NADPH
Water	Oxygen



Energy is transferred along thylakoid membranes to be used for Light-Independent reactions

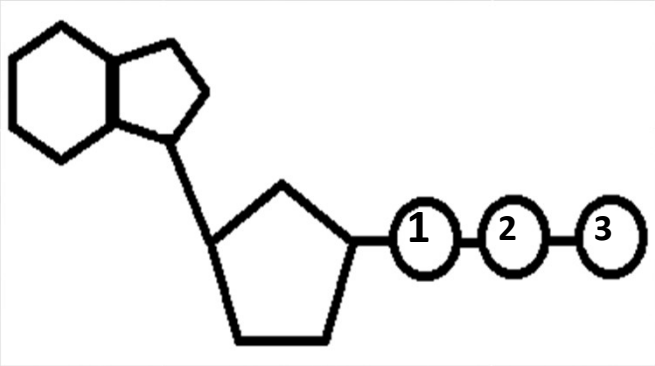
Stage 2: Light-Independent reactions (the Calvin cycle) occurs in the stroma and creates carbohydrates (sugar) from carbon dioxide & energy stored during the light-dependent reactions

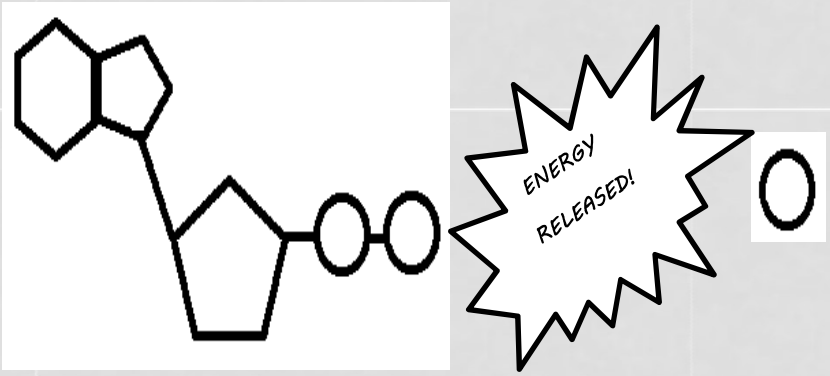
What Goes In? (needed)	What Goes Out? (produced)
ATP, NADPH	Glucose *(sugar) which is stores in plant's structures as cellulose*
Carbon Dioxide	



What is ATP?

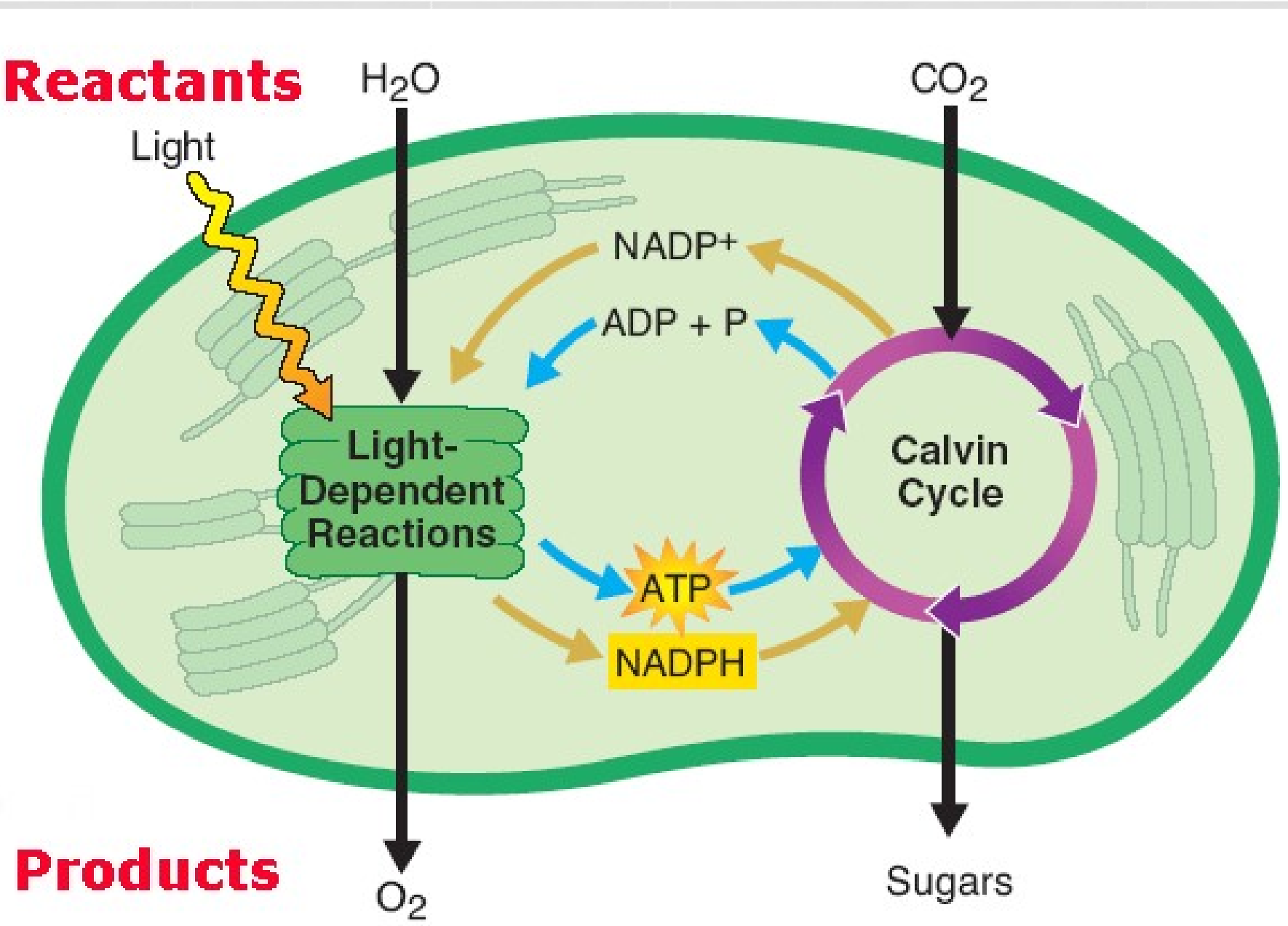
- ATP (Adenosine Triphosphate) stores energy until a cell needs it. When a cell requires energy, it breaks off the last (3rd) phosphate group from the ATP molecule, which releases energy. The new molecules is called ADP (Adenosine Diphosphate)





ATP AND GLUCOSE

ATP	Glucose
Short Term	Long Term Storage
Transfers energy very quickly	Takes longer to get energy out
Can’t store energy very long. (breaks down to ADP and loses energy)	Can store energy very well. 1 molecule of glucose can hold 90x more energy than ATP.


Reactants
H_2O
CO_2
Light
NADP+
ADP + P
Light-Dependent Reactions
Calvin Cycle
ATP
NADPH
Products
O_2
Sugars