AP BIOLOGY
CELLULAR ENERGETICS
ACTIVITY #4

NAME_____

DATE_____HOUR_____

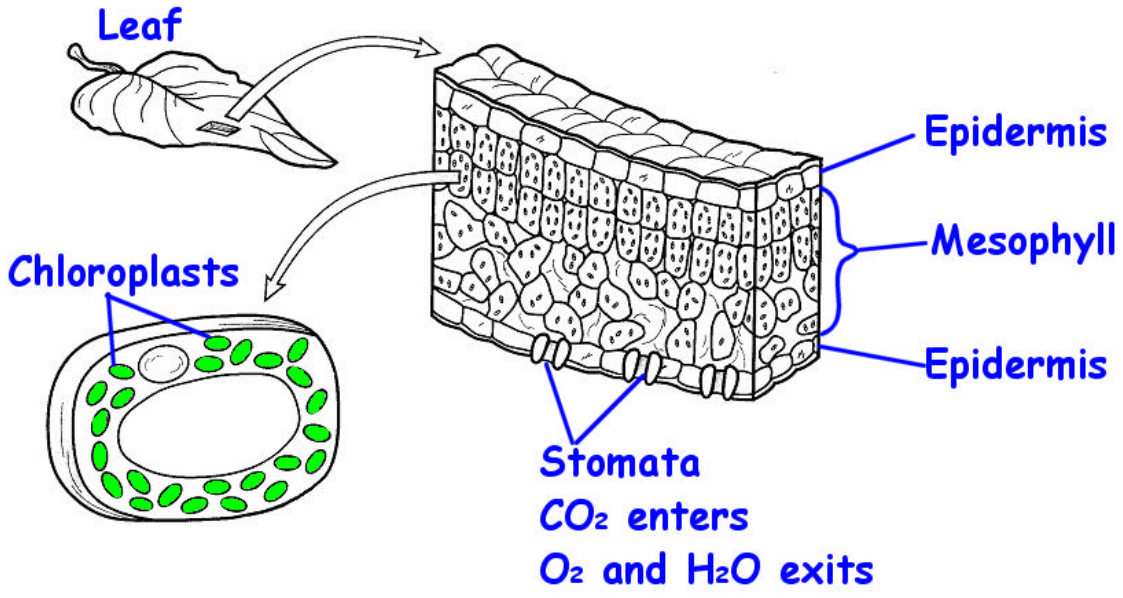
PHOTOSYNTHESIS

SUMMARY EQUATION

$6CO_2 + 12H_2O + \text{light} \rightarrow C_6H_{12}O_6 + 6O_2 + 6H_2O$

$6CO_2 + 6H_2O + \text{light} \rightarrow C_6H_{12}O_6 + 6O_2$

SITE OF PHOTOSYNTHESIS -- PLANTS

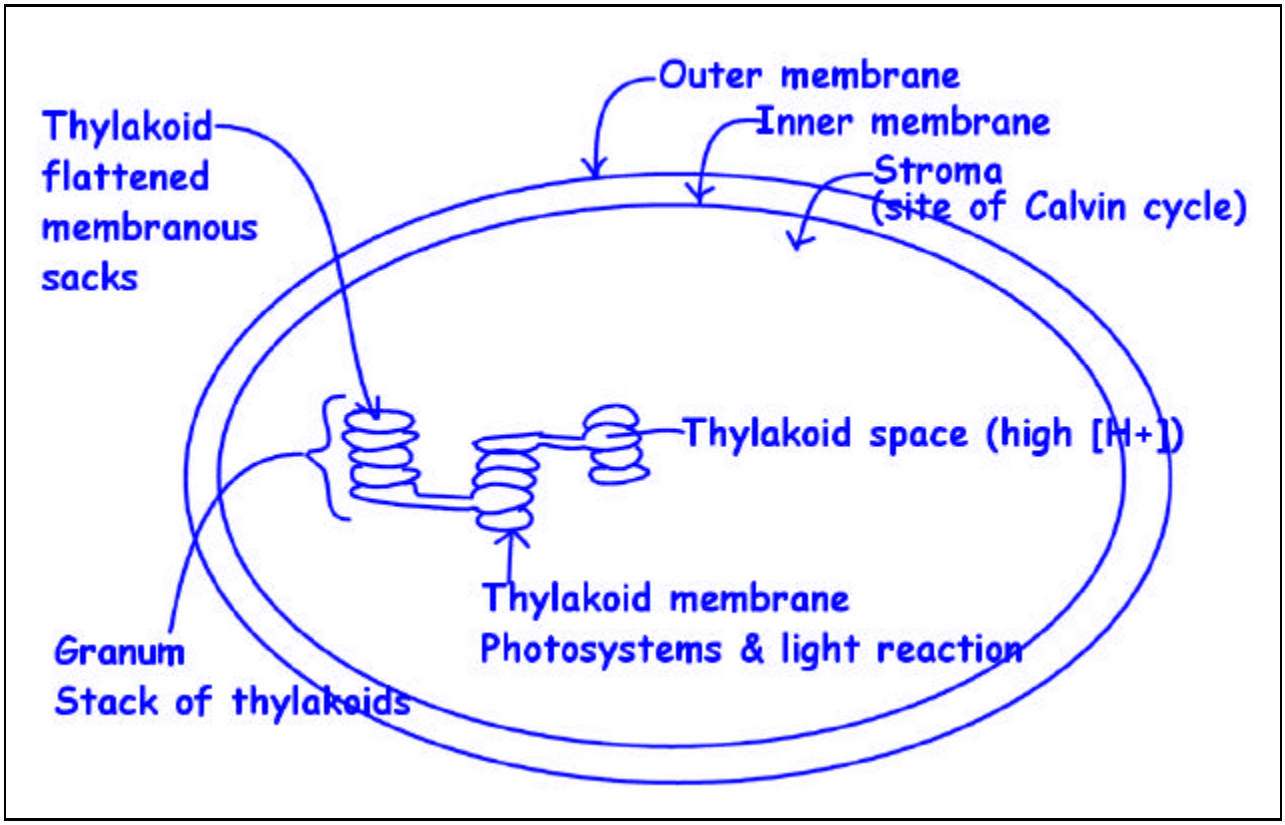


Water:
- absorbed by roots
- travels up the stem through the xylem
- enters veins in leaf

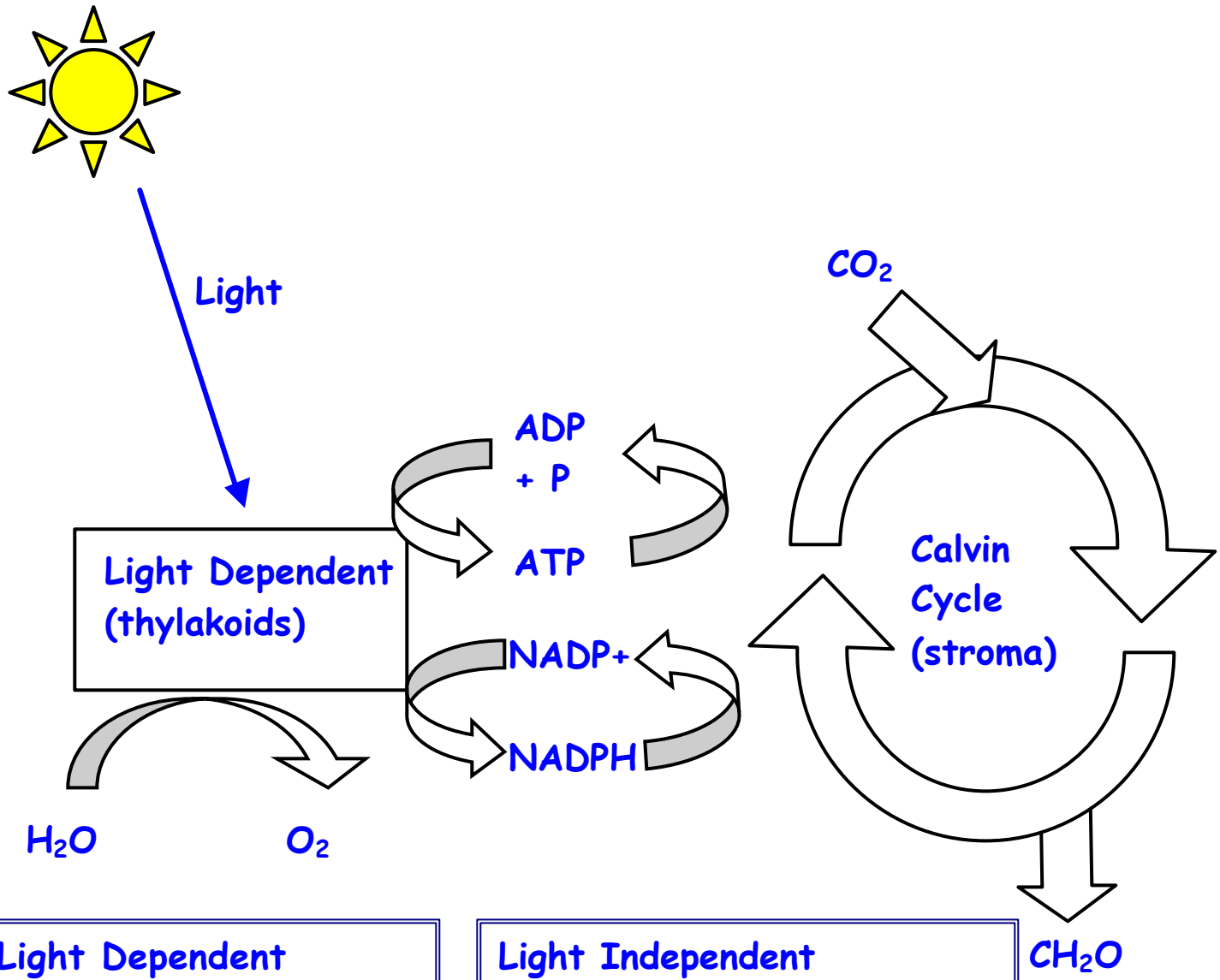
SITE OF PHOTOSYNTHESIS – PROKARYOTES

Lack chloroplasts
Chlorophyll built into plasma membrane

STRUCTURE OF CHLOROPLASTS



OVERVIEW OF PHOTOSYNTHESIS



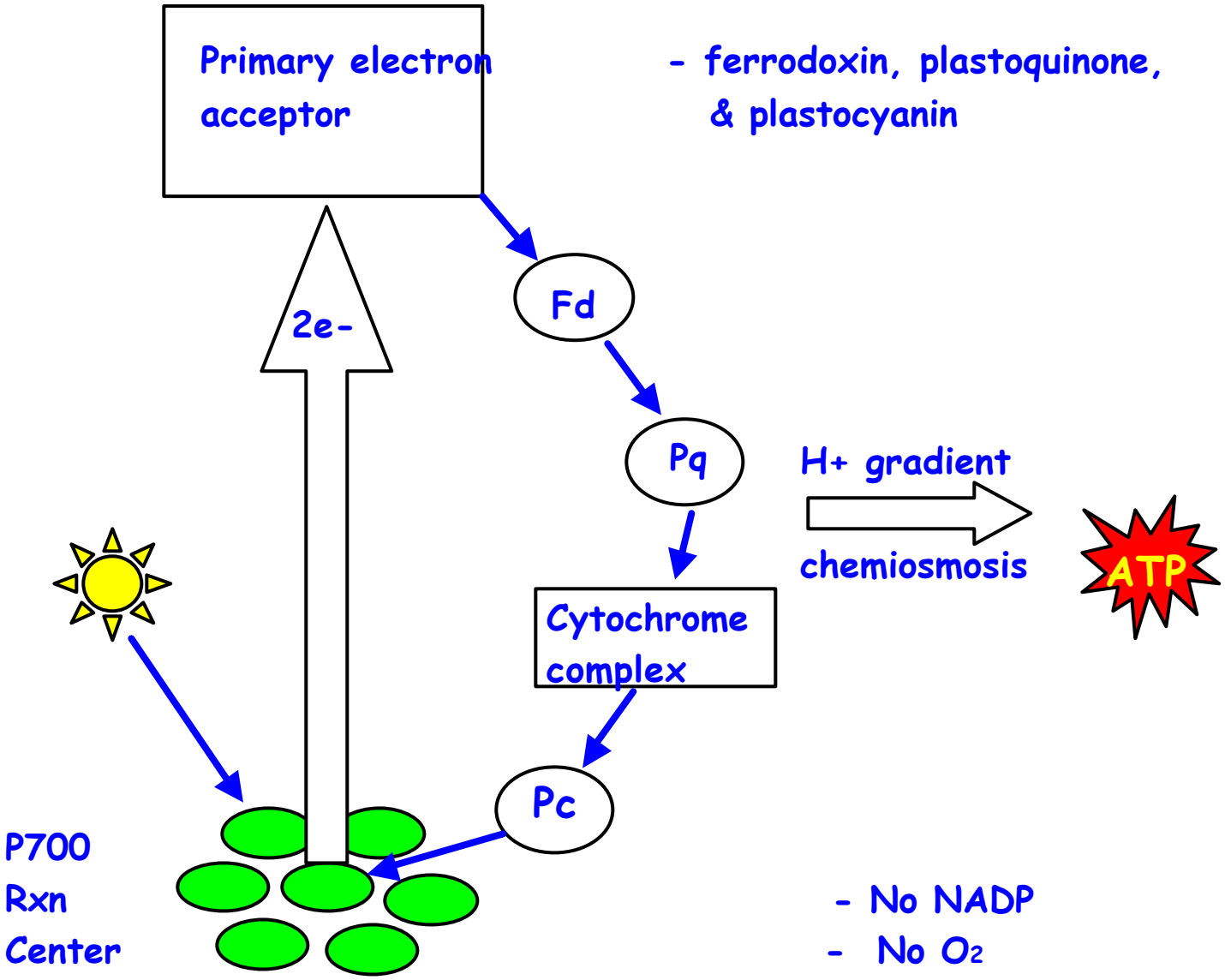
Light Dependent

- Take e- from H_2O
- Use light energy to boost e- to higher energy level
- Use some energy to make ATP
- Add high energy e- to NADP+

Light Independent

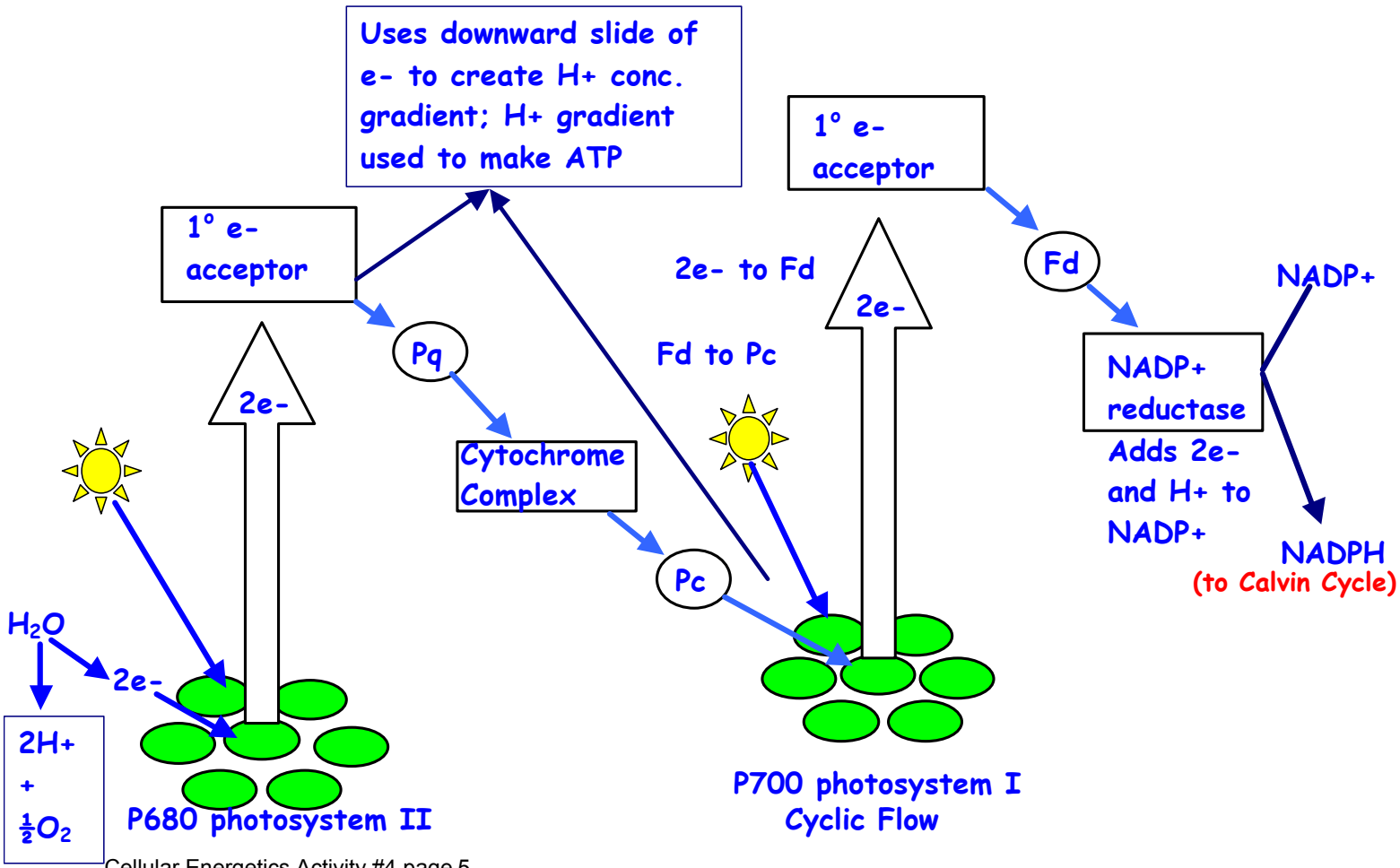
- AKA Calvin Cycle
- Uses ATP produced in light rxn
- Takes high energy e- from NADPH and adds them to CO_2
- Produces sugar 1 carbon at a time

LIGHT REACTIONS – CYCLIC ELECTRON FLOW

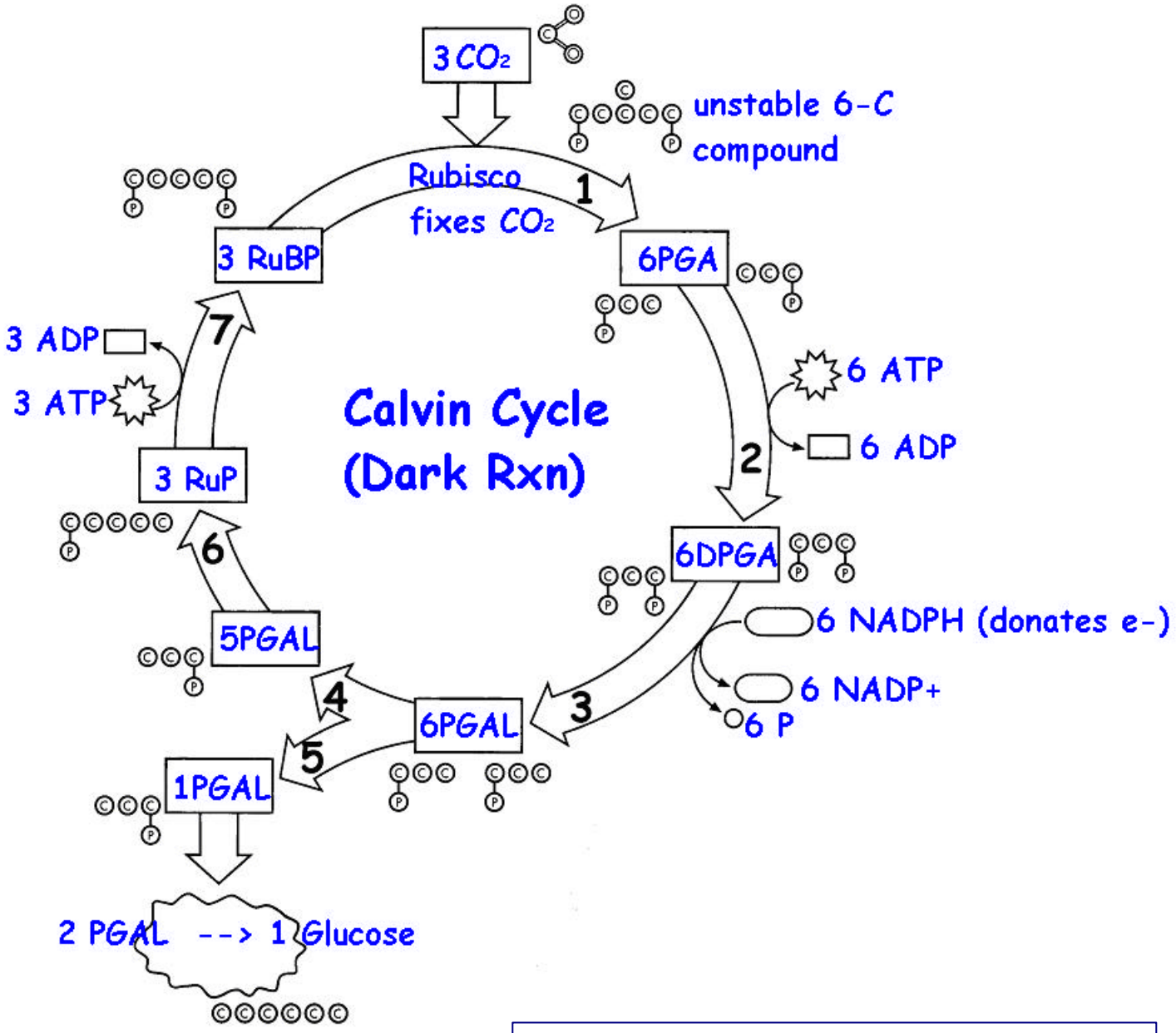


Photosystem I
Few 100 pigment molecules (chlorophyll a, b, & carotenoids)
Reaction center
  Chlorophyll a molecule
  Bound to specific proteins
  Closer to 1° electron acceptor
Antenna pigments absorb photons and pass to rxn center

LIGHT REACTIONS – NONCYCLIC ELECTRON FLOW



CALVIN CYCLE Light Independent RXN Location = Stroma



RuBP = ribulose biphosphate
Rubisco = RuBP carboxylase
PGA = phosphoglycerate
DPGA = diphosphoglycerate
PGAL = phosphoglyceraldehyde=G3P
G3P = glyceraldehyde3phosphate
RuP = ribulose phosphate