

# The Process of Photosynthesis

## Light-Dependent Reactions

Photosynthesis begins in the thylakoid membranes of the chloroplast.

High energy electrons form when pigments in Photosystem II absorb light.

The electrons pass through electron transport chains. This movement of electrons causes the inside of the thylakoids to fill with hydrogen ions ( $H^+$ ) and generates NADPH.

(Photosystem II)

(Photosystem I)

As  $H^+$  ions flow through a membrane protein call ATP synthase, it rotates and creates ATP in the process. (Photosystem I)

**Q 11** Light Dependent Reactions use sunlight energy and water to produce NADPH + ATP. The "waste" product of these reactions is oxygen ( $O_2$ ).

## Light Independent Reactions - (called Calvin Cycle)

These reactions occur with the liquid stroma of the chloroplasts. ATP + NADPH fuel these reactions.

**Q 12** The carbon dioxide from the atmosphere is taken in by the plant. The plant "fixes" the carbon or uses it to create high energy sugar + other biological molecules (lipids + amino acids).

# Light-Independent Reactions = Calvin Cycle

\* Producing Sugars \*

10. What does the Calvin cycle use to produce high-energy sugars?

The Calvin cycle uses carbon dioxide, ATP + NADPH to produce high energy sugars.

11. Why are the reactions of the Calvin cycle called light-independent reactions?

The reactions do not use light energy directly to fuel the process. The reactions use stored chemical energy.

12. What makes the Calvin cycle a cycle?

The carbon compounds are recycled over & over again.

13. Complete the diagram of the Calvin cycle by filling in the missing labels.

