Summary of Photosynthesis Notes

What kinds of organisms undergo photosynthesis?
- BACTERIA
- ALGAE
- PLANTS

How do plants change light energy into chemical energy?
- By carrying out photosynthesis
- Producers store energy from sunlight as chemical energy in organic molecules
  - Mainly carbohydrates (glucose, sucrose, cellulose and starches)

Light
- Radiant energy & travels in waves.
- Visible spectrum is the wavelength range that is visible to humans.
- Consists of colors that make up white light.
- Visible spectrum – Red, Orange, Yellow, Green, Blue, Indigo, Violet

Green Plants
GREEN objects reflect green light and absorb all the other colors.

Pigments
- Chlorophyll is the pigment that makes plants GREEN.

Overall CHEMICAL Reaction for Photosynthesis

\[6 \text{(CO}_2\text{)} + 6 \text{(H}_2\text{O)} + \text{ENERGY } \text{SUN} \rightarrow \text{C}_6\text{H}_12\text{O}_6 + 6 \text{(O}_2\text{)}\]

PHOTOSYNTHESIS IS AN ENDO THERMIC.
A. THERMIC has to do with heat energy
B. ENDO=INSIDE
  ENDO-THERMIC REACTION \(\rightarrow\) require energy to occur.
C. EXO=OUTSIDE
  EXO-THERMIC REACTION \(\rightarrow\) release energy when they occur.

  carbon dioxide + water + ENERGY \(\rightarrow\) glucose + oxygen

Two Main Reactions in Photosynthesis

Reaction 1: Light Dependent Reactions
- They convert solar energy into NADPH and ATP.
- Light shines on chloroplast which contains several pigments one of them is chlorophyll.
- Energy in chlorophyll is used to add an electron to an acceptor molecule and it is passed onto other “acceptor” molecules like NADP⁺.
- NADP⁺ + H⁺ + e⁻ \(\rightarrow\) NADPH. NADPH is later used to make ATP.
- Inside the thylakoid, we find the Photosystems (I and II).
- Water (H₂O) is split and oxygen (O₂) leaves as waste product.

Where do the light-dependent reactions take place?
- In the thylakoids. These structures are found in the grana.
- Grana are found in the chloroplasts. (grana are stacks of thylakoid membranes)
- One granum = a stack of thylakoids membranes
PHOTOSYSTEM II
- Solar Energy is absorbed.
- Water is split.
- Energy excites the electrons (Hydrogen from water)
- Electrons enter the electron transport chain (E.T.C.).
- ATP is produced.

PHOTOSYSTEM I
- Electrons are accepted from the E.T.C.
- Water is absorbed.
- Energy excites the electrons even further.
- Electrons travel through another electron transport chain.
- NADPH is produced.

Reaction 2: Calvin Cycle (Dark Reactions), Light Independent Reactions
- Uses ATP from light reactions, Carbon, Hydrogen and Oxygen to produce glucose
- Can be used for synthesis of carbohydrates or other organic molecules in various forms.
- 6 molecules of CO₂ are needed to make one molecule of glucose.

Where do the light-independent reactions take place?
- In the __________________________ of chloroplasts (stroma is the ______________ part of the chloroplast)

CHLOROPLAST:

What factors influence photosynthesis? Why?
- Light intensity. Because more intense light = more energy= more electrons “excite” and photosynthesis occurs more rapidly (to a point then it can't go any further!).
- Temperature. Because more heat = more energy= more electrons “excite” and photosynthesis occurs more rapidly (to a point then it can't go any further!).
- Color of light. Because chlorophyll is “sensitive” to certain colors (wave lengths) not others.
- Availability of water (H₂O) and carbon (CO₂). Because the organism needs these substrates in order to carry out photosynthesis.