Photosynthesis

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6CO_2 + 6H_2O 
ightarrow C_6H_{12}O_6 + 6O_2 Carbon Dioxide + Water 
ightarrow Glucose + Oxygen
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- Happens in the Chloroplasts
 - Inside the Grana (stacks of Thylakoids)
 - Inside the Thylakoid is cholophyll (pigment)
 - Inside the Stroma (outside the grana)
- Produces NADPH and ATP
- Chlorophyll absorbs mainly red and blue light

Light Dependent Reaction (Electron Transport)

- Inside the Thylakoid
- High gradient of Hydrogen is inside the Thylakoid Space
 - The low pressure is the **Stroma**
- It produces NADPH and ATP
- 1. Light excites electrons inside Photosystem II
 - 1. Causes a water molecule to split
 - 2. Sends a proton (Hydrogen ion) into the thylakoid space from the stroma
 - 3. Oxygen is released (from water)
- 2. Electrons through the electron accepter molecule down the electron carriers to Photosystem I
- Electrons are transferred to ferrodoxin in Photosystem I
- 4. Ferrodoxin transfers electrons to NADP+ and releases it into the Stroma
 - 1. Turns the NADP+ into NADPH
- 5. Protons move down the gradient through the ATP synthase to the Stroma
 - 1. Turns ADP into ATP

Light Independent Reaction (Calvin Cycle)

- Converts the NADPH and ATP into glucose for long term storage
- Uses 18 ATP and 12 NADPH to make one glucose
- Happens inside the Stroma, outside the Thylakoid

Steps in the Calvin Cycle

1) Carbon Fixation

1. $CO_2 + C_5H_{12}O_{11}P_2 \rightarrow C_6H_{14}O_{11}P_2$ Carbon Dioxide + RuBP (5C) \rightarrow 6-Carbon intermediary

Simplified:

$$CO_2 + 5C \rightarrow 6C$$

Carbon Dioxide + RuBP (5C) \rightarrow 6C

2. $C_6H_{14}O_{11}P_2 + H_2O \rightarrow 2C_3H_7O_7P$ 6-Carbon intermediary + Water \rightarrow 2 3-PGA (3C)

Simplified:

$$6C + H_2O
ightarrow 2(3C)$$

6C + Water $ightarrow$ 2 3-PGA (3C)

Overall

$$CO_2+C_5H_{12}O_{11}P_2+H_2O
ightarrow 2C_3H_7O_7P$$
 Carbon Dioxide + RuBP (5C) + Water $ightarrow$ 2 3-PGA (3C)

Simplified:

$$CO_2 + 3(5C) + H_2O
ightarrow 2(3C)$$
 Carbon Dioxide + RuBP (5C) + Water $ightarrow$ 2 3-PGA (3C)

2) Reduction

$$C_3H_7O_7P + ATP + NADPH \rightarrow C_3H_5O_6P + ADP + NADP$$

3-PGA (3C) + ATP + NADPH \rightarrow G3P + ADP + NAPH

Simplified:

$$3C + ATP + NADPH \rightarrow 3C$$

3-PGA (3C) + ATP + NADPH \rightarrow G3P (3C)

3) Regeneration

- One G3P leaves the cycle to produce Glucose
- The other 5 stay to regenerate the RuBP

$$5C_3H_5O_6P + 3ATP
ightarrow 3C_5H_{12}O_{11}P_2 + 3ADP$$

 5 G3P + 3 ATP $ightarrow$ 3 RuBP + ADP

4) Glucose Formation

 $2C_3H_5O_6P \rightarrow C_6H_{12}O_6$ 2 G3P \rightarrow Glucose

I couldn't find anything about this so idk what to put