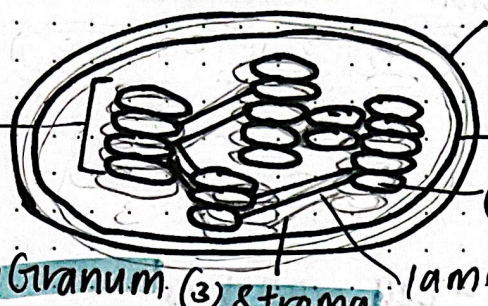
Chloroplast structure



① **thylakoid**
- disc-shaped sacs
- contain chlorophyll
- in thylakoid membrane:
  → ✓ photosynthetic pigments that trap sunlight
- site for light-dependent reaction

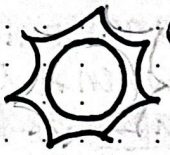
② **Granum**
- disc-shaped stack of thylakoid
  ↳ increases the S.A.
  ↳ optimal photosyn.

③ **stroma**
- colourless fluid surrounding granum in chloroplast
- site for light-independent reaction ⇒ produce glucose

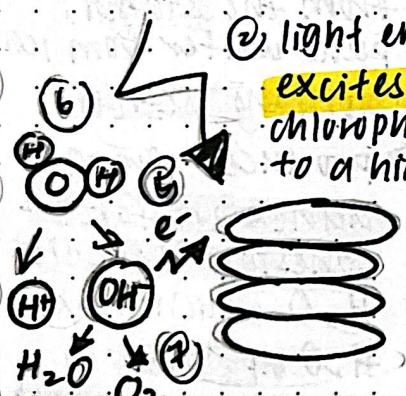
$$12H_2O + 6CO_2 \xrightarrow{\text{Light energy, Chlorophyll}} C_6H_{12}O_6 + 6O_2$$

overall reaction

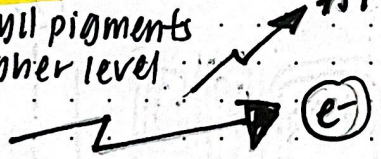
light-dependent reactions



① Photosynthetic pigments on the surface of thylakoids absorb light energy



② light energy excites e⁻ in chlorophyll pigments to a higher level



③ - excited e⁻ go thru a series of e⁻ carriers.
- energy from e⁻ is used to generate energy in the form of ATP

⑤ chlorophyll pigments attracts e⁻ from H_2O to become stable via photolysis

⑥ Photolysis
→ a process whereby H_2O molecules are broken down to form $H^+ + OH^-$ in the presence of light energy + chlorophyll

④ Hydroxide ions lose e⁻ to form $O_2 + H_2O$

④ e⁻ are accepted by the last e⁻ acceptor = NADP+
- NADP+ combines w/ H^+ to form NADPH (reducing agent)

$$e^- + NADP^+ + H^+ \rightarrow NADPH$$

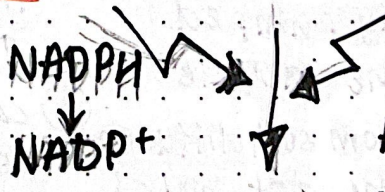
light-independent reactions

5-carbon organic compounds ← CO_2

① 5-C fix CO_2 gas to form 6C.

6-carbon organic compounds

② NADPH + ATP (from LDR) reduces organic comp. to glucose monomers



③ Glucose monomers condensate to form starch molecules stored in stroma

$6(CH_2O) \rightarrow C_6H_{12}O_6$ [glucose monomer]