Objectives:
1) Be able to broadly describe photosynthesis and its utility for plants and animals.
2) Know the products and reactants of photosynthesis, and where the reactants come from.
3) Know where photosynthesis takes place.
4) Understand why plants are green (?).

Divisions of photosynthesis
1) Light reactions
   light + H₂O + NADP + ADP + P -> ATP + NADPH + O₂ + H₂
2) Calvin Cycle
   CO₂ + ATP + NADPH -> Glucose + ADP + P + NADP

Light Reactions
- Complex (many pigments, enzymes, and structures required).
- Occurs in the chloroplast (1/2 million chloroplasts per mm² of leaf surface!).
- Reminiscent of the Electron Transport Chain.
- Step 1. Absorption of light by a pigment in a photosystem.
  Chlorophyll is one of the main pigments.

  Uno 10.2, Fig 8.4

The light charges up an electron that gets passed to an electron acceptor.

  Fig 8.6, (8.5?), Uno 10.7

The electron is replaced by an electron from water (this gives rise to O₂ generation).

  Fig 8.8, Uno 10.8

- Hydrogens are created and pumped into the thylakoid, creating a gradient.
- The gradient’s energy is harnessed to create ATP.
- The electron’s remaining energy is passed off to NADPH.

Side Note: The primary electron acceptor is an iron containing protein.
Calvin Cycle

- The NADPH and ATP are used to convert CO\textsubscript{2} into glucose.
- CC is a cyclical metabolic pathway.

- The step (reaction) that assimilates carbon dioxide utilized the most abundant protein on the planet—Rubisco.
  - The carbon molecules coming out of the CC have more “potential” energy than CO\textsubscript{2}.
- The energy was harvested from sunlight.