KEY CONCEPT
Photosynthesis requires a series of chemical reactions.
The first stage of photosynthesis captures and transfers energy.

- The light-dependent reactions include groups of molecules called photosystems.
4.3 Photosynthesis in Detail

- Photosystem II captures and transfers energy.
  - Chlorophyll absorbs energy from sunlight.
  - Energized electrons enter the electron transport chain.
  - Water molecules are split.
  - Oxygen is released as waste.
  - Hydrogen ions are transported across the thylakoid membrane.
4.3 Photosynthesis in Detail

- Photosystem I captures energy and produces energy-carrying molecules.
  - chlorophyll absorbs energy from sunlight
  - energized electrons are used to make NADPH
  - NADPH is transferred to light-independent reactions
4.3 Photosynthesis in Detail

- The light-dependent reactions produce ATP.
  - hydrogen ions flow through a channel in the thylakoid membrane
  - ATP synthase attached to the channel makes ATP
The second stage of photosynthesis uses energy from the first stage to make sugars.

- Light-independent reactions occur in the stroma and use CO$_2$ molecules.

Light-independent reactions take place in the stroma.
4.3 Photosynthesis in Detail

- A molecule of glucose is formed as it stores some of the energy captured from sunlight.
  - carbon dioxide molecules enter the Calvin cycle
  - energy is added and carbon molecules are rearranged
  - a high-energy three-carbon molecule leaves the cycle
4.3 Photosynthesis in Detail

- A molecule of glucose is formed as it stores some of the energy captured from sunlight.
  - two three-carbon molecules bond to form a sugar
  - remaining molecules stay in the cycle