

# Photosynthesis

AP Biology · Unit 3: Cellular Energetics

## The Teaching Analogy

*"Picture a stack of pancakes — those stacked discs are your thylakoids, where the light reactions happen. The sun hits the pancakes, and the chlorophyll captures that energy. Now picture syrup pooling around the stack — that's the stroma, where the Calvin cycle runs. Two stages, one breakfast plate."*

## Key Concept

Photosynthesis occurs in two stages inside the chloroplast. The **light reactions** occur in the thylakoid membranes — chlorophyll absorbs sunlight, splits water, and produces ATP and NADPH. The **Calvin cycle** occurs in the stroma — the enzyme RuBisCO uses ATP and NADPH to fix CO<sub>2</sub> from the air into glucose (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>).

## Guided Practice

1. In our pancake analogy, what does the syrup represent, and what chemical process happens there?
2. If the "pancakes" (thylakoids) stop receiving sunlight, what happens to the Calvin cycle and why?
3. RuBisCO is described as grabbing CO<sub>2</sub> from the air. What molecule does it combine CO<sub>2</sub> with, and what is the 3-carbon product?

## Extension Activity

**Breakfast Plate Diagram:** Draw a chloroplast and label the thylakoids as "pancakes" and the stroma as "syrup." Add arrows showing where ATP and NADPH are produced (pancakes) and where they are consumed (syrup). Include the inputs and outputs of each stage. Then write one sentence explaining why the two stages depend on each other.