

may be on the test

"once they make the sugar they get energy"

## Unit 4 Cellular Energetics

Chapter 10  
light → make  
Photosynthesis

"plants use light from the sun to make sugar"

### Introduction

**Photosynthesis** is the process that converts solar energy into chemical energy

- Directly or indirectly, photosynthesis nourishes almost the entire living world
- Autotrophs** sustain themselves without eating anything derived from other organisms
  - Autotrophs are the producers of the biosphere, producing organic molecules from CO<sub>2</sub> and other inorganic molecules
  - Almost all plants are photoautotrophs, using the energy of sunlight to make organic molecules from H<sub>2</sub>O and CO<sub>2</sub>
- Heterotrophs** obtain their organic material from other organisms
  - Heterotrophs are the consumers of the biosphere
  - Almost all heterotrophs, including humans, depend on photoautotrophs for food and O<sub>2</sub>

### Photosynthesis converts light energy to the chemical energy of food.

**Chloroplasts** are structurally similar to and likely evolved from photosynthetic bacteria

- The structural organization of these cells allows for the chemical reactions of photosynthesis

thylakoids a full stack  
stroma is the empty space

this is not part of the endome membrane system

### Photosynthesis converts light energy to the chemical energy of food.

- Chloroplasts are the sites of photosynthesis in plants
  - leaves are the major locations of photosynthesis
  - The internal color is from **chlorophyll**, the green pigment within chloroplasts
  - Light energy absorbed by chlorophyll drives the synthesis of organic molecules in the chloroplast
  - CO<sub>2</sub> enters and O<sub>2</sub> exits the leaf through microscopic pores called **stomata**
- Chloroplasts are found mainly in cells of the mesophyll, the innermost tissue of the leaf
  - A typical mesophyll cell has 30–50 chloroplasts
  - The chlorophyll is in the membranes of **thylakoids**, connected sacs in the chloroplast; thylakoids may be stacked in columns called **grana**
  - Chloroplasts also contain **stroma**, a dense fluid

Chloroplasts are found mostly in the cells of the mesophyll, the innermost tissue of the leaf

make CO<sub>2</sub> and oxygen come in and out

Stroma

### Photosynthesis converts light energy to the chemical energy of food.

- Tracking Atoms Through Photosynthesis
  - Photosynthesis can be summarized as the following equation:

$$6 \text{CO}_2 + 12 \text{H}_2\text{O} + \text{Light Energy} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{O}_2 + 6 \text{H}_2\text{O}$$

- Chloroplasts split H<sub>2</sub>O into hydrogen and oxygen, incorporating the electrons of hydrogen into sugar molecules

# Ap Biology Cellular Energetics Activity 4 Photosynthesis Answers

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