

***Note: Vocab words are in BOLD throughout the reading**

PHOTOSYNTHESIS -PART I: THE SUN AND LIGHT

Not all of the light from the sun makes it to the surface of the Earth. Even the light that does make it here is reflected and spread out. The little light that does make it here is enough for the plants of the world to survive and go through the process of **photosynthesis**. Light is actually energy. When that energy gets to a plant, all sorts of reactions can take place to store energy in the form of sugar molecules aka glucose.

1. What kind of energy is needed for photosynthesis to occur?
2. What kind of energy is produced during photosynthesis?

Remember we said that not all the energy from the Sun makes it to plants? Even when light gets to a plant, the plant doesn't use all of it. It actually uses only certain colors to make photosynthesis happen. Plants mostly absorb red and blue wavelengths. When you see a color, it is actually a color that the object does NOT absorb. In the case of green plants, they do not absorb light from the green range, instead it is reflected.

3. Explain why most plants look green.

PART II: THE CHLOROPLAST

Photosynthesis is a chemical reaction that occurs within the **chloroplasts** of a plant cell; animals do not have chloroplasts. Within this cell organelle is a pigment called **chlorophyll** that captures the light from the Sun. We'll talk about it in a bit, but the chloroplasts are working night and day with different jobs.

4. What chemical reaction occurs in the chloroplast?
5. Do animals have chloroplasts? _____
6. Can animals photosynthesize? _____
7. What is the role of the chlorophyll?

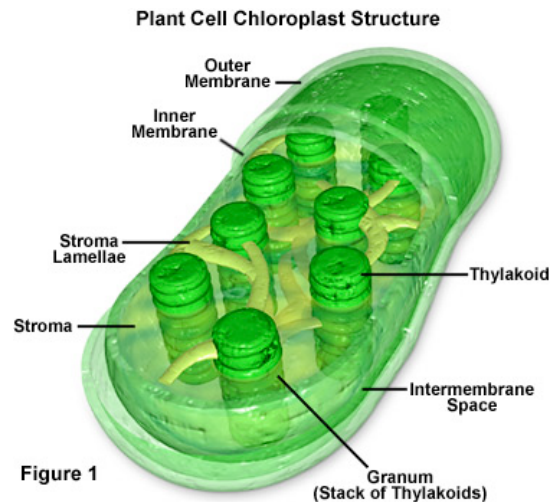


Figure 1

PART III: THE MOLECULES

Chlorophyll is the magic compound that can "grab" that sunlight and start the whole process. Chlorophyll is actually quite a varied compound. There are four (4) types: a, b, c, and d. Chlorophyll can also be found in many microorganisms and even some prokaryotic cells.

8. Structures determine functions..... Do you think the microorganisms and prokaryotes that have chlorophyll can do photosynthesis? _____ Why or why not?

Here are three different ways to visualize the photosynthesis reaction:

Photosynthesis in pictures	Photosynthesis in words	Photosynthesis in symbols
<p>The diagram shows a sun at the top left with rays and the word 'SUN' next to it. A wavy arrow labeled 'ENERGY' points from the sun to a central oval labeled 'CHLOROPLAST'. From the bottom left, 'CO₂' and 'WATER' are written with a plus sign between them. An arrow points from these reactants into the chloroplast. From the bottom right, an arrow points out of the chloroplast to 'SUGAR' and 'OXYGEN' written with a plus sign between them.</p>	<p>Carbon dioxide and water combine with light to create oxygen and glucose.</p>	$6\text{CO}_2 + 6\text{H}_2\text{O} + \text{light} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ <p>Reactants → Products</p>

9. What are the reactants of photosynthesis? (what begins the reaction)

10. Animals need the products of photosynthesis to survive. What are these products?

Energy-producing process	Reaction	Location in cell
Photosynthesis	11. _____	Chloroplast
Cellular respiration	$\text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{O}_2 \rightarrow 6 \text{H}_2\text{O} + 6\text{CO}_2 + \text{energy}$	12. _____

13. Look at the reactions for photosynthesis and respiration. What is the relationship between the two?

PART IV: Plant Survival Basics

Transpiration is the evaporation of water into the atmosphere from the leaves and stems of plants. Plants absorb soil water through their roots and this water can originate from deep in the soil. **Xylem** pumps the water up from the soil from the roots to deliver nutrients to the leaves. **Phloem** carries sugar (nutrients) to all the parts of the plant where needed.

14. What is the purpose of xylem? What is the purpose of phloem?

15. Diagram a simple plant showing xylem and phloem and what is moving in the xylem and phloem. Use arrows to show the direction these materials are moving.