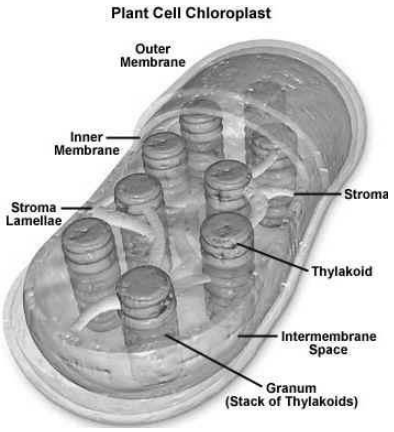
Name:_____KEY_____Date:_____Period:____

Photosynthesis: Making Energy

Chloroplasts



Photosynthesis is a process in which sunlight energy is used to make glucose. The site of photosynthesis is in the **chloroplast** – an organelle found in the leaves of green plants. The main functions of chloroplasts are to produce food (**glucose**) during **photosynthesis**, and to store food energy. Chloroplasts contain the pigment, *chlorophyll*. Chlorophyll absorbs most of the colors in the color spectrum, and reflects only green and yellow wavelengths of light. This is why we see leaves as green or yellow – because these colors are reflected into our eyes.

1. What is photosynthesis? _____ a process in which sunlight energy is used to make glucose.
2. Where does photosynthesis occur? _____ The site of photosynthesis is in the **chloroplast** – an organelle found in the leaves of green plants _____
3. What are chloroplasts and where are they found?
   _____
   _____
4. What are the two main functions of chloroplasts? _____ to produce food (**glucose**) during **photosynthesis**, and to store food energy
   _____
5. Why do most leaves appear green? _____ Chloroplasts contain the pigment, *chlorophyll*. Chlorophyll absorbs most of the colors in the color spectrum, and reflects only green and yellow wavelengths of light. This is why we see leaves as green _____
6. What is the primary pigment found in the chloroplast? _____ *chlorophyll*
   _____

Photosynthesis

Glucose is another name for sugar. The molecular formula for glucose is $C_6H_{12}O_6$. Plants make sugar by using the energy from sunlight to transform CO_2 from the air with water from the ground into glucose. This process, called photosynthesis occurs in the chloroplast of the plant cell. During this process, oxygen (O_2) is created as a waste product and is released into the air for us to breath. The formula for photosynthesis is:

(reactants) (products)

$$CO_2 + H_2O + \text{sunlight} \text{ ----> } C_6H_{12}O_6 + O_2$$

This formula says that carbon dioxide + water molecules are combined with the energy from sunlight to produce sugar and oxygen. The reactants in photosynthesis (what is used) are CO_2, water and sun. The plant gets water from the ground through its roots. The plant collects carbon dioxide from the air. Much of the carbon dioxide comes from living organisms that exhale (breath it out) it, but some also comes from factory smokestacks and car fumes.

7. What is the formula for photosynthesis? (reactants) (products)

$CO_2 + H_2O + \text{sunlight} \text{ ----> } C_6H_{12}O_6 + O_2$

8. What three things are used to make glucose in photosynthesis? $CO_2 + H_2O + \text{sunlight}$
9. Where does the water come from? The plant gets water from the ground through its roots.
10. Where does the water enter the plant? Roots
11. Name 3 some sources of CO_2. Animals that breath it out, factory smoke stacks and cars.
12. What type of energy does the plant use to convert CO_2 and H_2O into sugar? Solar or Sunlight

The products are **glucose** and **oxygen**. The glucose produced is used by the plant for energy and growth. We also use this glucose by eating plants. The oxygen produced is released into the air for us to breath. Photosynthesis is essential for all life on earth, because it provides food and oxygen. Plants are considered autotrophs because unlike us humans, they can make their own food using this process.

13. What is produced in photosynthesis? glucose and oxygen
14. What is the glucose used for? Used by the plants for energy and growth
15. What is the oxygen used for? Organisms use the oxygen for cellular respiration.

Photosynthesis in pictures	Photosynthesis in words	Photosynthesis in symbols
Pictures should show sunlight the molecule structures (simple or complex)	Sunlight+water+carbon dioxide yields glucose +oxygen	$CO_2 + H_2O + \text{sunlight} \text{ ----> } C_6H_{12}O_6 + O_2$

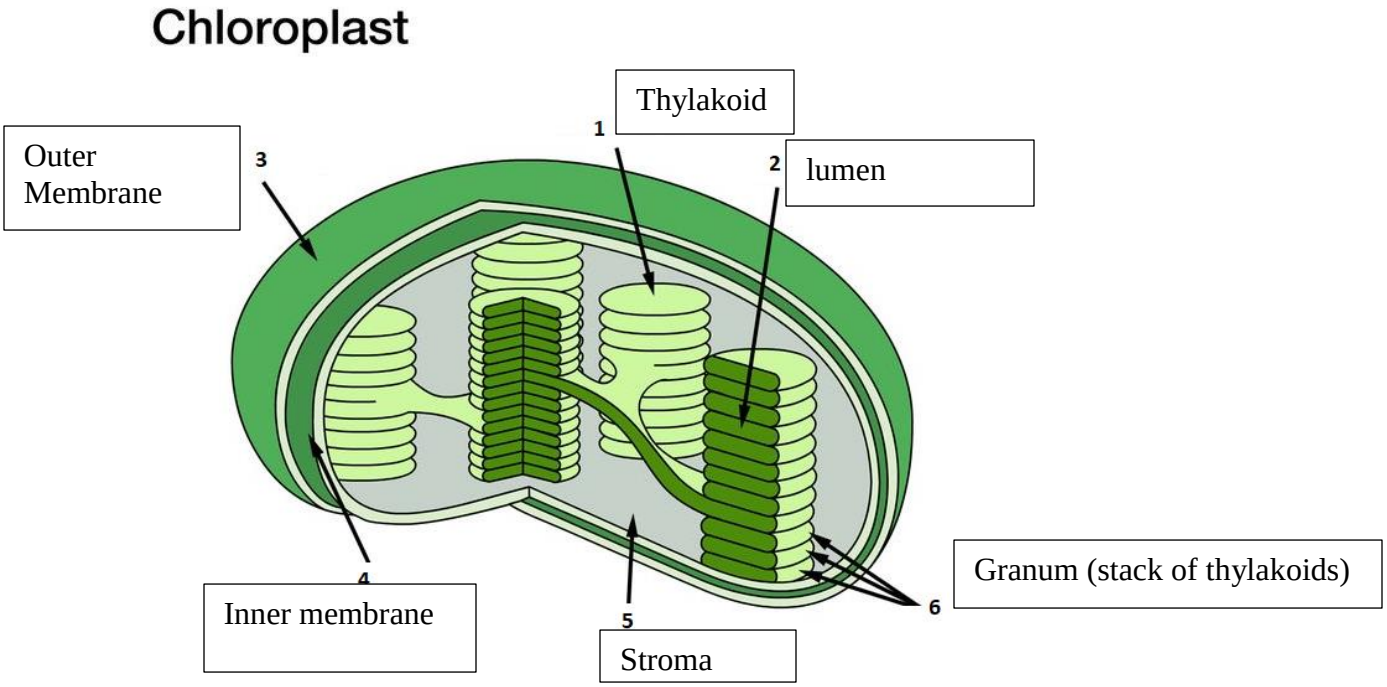
<u>Essential Question</u>: Describe, using scientific terms, how plants turn sunlight into energy? Make sure to refer to the chemical equation to photosynthesis and discuss the reactants and products.

Detailed: Photosynthesis is a process that plants use to make organic compounds (glucose) from inorganic compounds water and carbon dioxide. For this to occur, light must be absorbed by the chlorophyll in the thylakoid of the chloroplast. This causes the water to split creating electrical energy. Oxygen is created when the water is split, the oxygen then exits the plants leaf through the stomata. Next, the NADP electron carrier grabs the excited hydrogen and becomes NADPH though the electron transport chain where ATP (chemical energy) is also created. The NADPH and ATP leave the thylakoid of the grana and enter the stroma. The carbon dioxide from the air enters the stroma through the stomata. The ATP is needed to remove the Hydrogen from the NADPH. The Hydrogen is given to the Carbon dioxide to form glucose.

Big Picture: Photosynthesis is a process that plants use to create a usable form of energy from inorganic compounds. Plants use solar energy along with the reactants carbon dioxide and water to create the products glucose and oxygen.

Label the following diagrams: You may use your notes to help you. You will need to be able to do this for the test.

Word Bank: Outer membrane, inner membrane, granum, stroma, thylakoid, lumen



Word Bank: CO2, H2O, Sugar, O2, NADPH, NADP+, ATP, ADP