

Cincinnati Public Schools

Remote Learning Plan

Grade 7

SCPA - 7 Science Moraga

Week 5- Photosynthesis & Respiration

Student Name _____ Bell _____

Weekly Outcomes:

- **Learning Outcome - Week 5: Photosynthesis/Respiration - Distinguish between photosynthesis and cellular respiration and identify photosynthesis and respiration using chemical formulas.**
- **Directions** - Do your Reading and Questions for the week. Then select and complete activities from the menu for that week. **OR** go one Schoology
- **Task** - Complete Reading Comprehension and the Read and Respond Non Fiction for the week and 100 points worth of work from the menu **for the week.**
- **How do I know if my work is good?**
 - Information is accurate.
 - All parts of the question are answered completely.
 - Work is detailed and completes the required task.
 - If applicable, work is colorful and visually appealing.
- **What if I need help?**
 - Visit www.discoveryeducation.com and read the Engage and Explore tabs for the following lessons (Do this through Schoology on the left hand side bar)
 - 2.1 (Photosynthesis)
 - Visit <http://studyjams.scholastic.com/studyjams/jams/science/plants/photosynthesis.htm> and explore the slide shows/videos listed below. Once finished, complete the "Test Yourself" activity.
 - Photosynthesis

Week 5: Photosynthesis/Respiration - Distinguish between photosynthesis and cellular respiration and identify photosynthesis and respiration using chemical formulas.

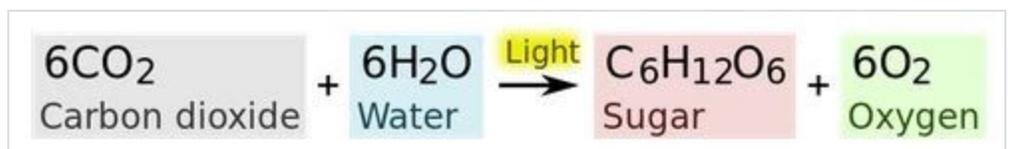
Photosynthesis and Respiration

Sources of Energy

The process by which a cell captures energy in sunlight and uses it to make food is called

photosynthesis (foh toh sin thuh sis). The term photosynthesis comes from the Greek words photo, which means "light," and synthesis, which means "putting together."

Photosynthesis



Nearly all living things obtain energy either directly or indirectly from the energy of sunlight captured during photosynthesis. Grass obtains energy directly from sunlight, because it makes its own food during photosynthesis. When

the zebra eats the grass, it gets energy that has been stored in the grass. Similarly, the lion obtains energy stored in the zebra. The zebra and lion both obtain the sun's energy indirectly, from the energy that the grass obtained through photosynthesis.

Plants manufacture their own food through the process of photosynthesis. An organism that makes its own food is called an **autotroph** (awt oh trahf). An organism that cannot make its own food, including animals such as the zebra and the lion, is called a **heterotroph** (het ur oh trahf). Many heterotrophs obtain food by eating other organisms. Some heterotrophs, such as fungi, absorb their food from other organisms.

The Two Stages of Photosynthesis

Photosynthesis is a complex process. **During photosynthesis, plants and some other organisms use energy from the sun to convert carbon dioxide and water into oxygen and sugars.** The process of photosynthesis is shown in Figure 14. You can think of photosynthesis as taking place in two stages: capturing the sun's energy and producing sugars. You're probably familiar with many two-stage processes. To make a cake, for example, the first stage is to combine the ingredients to make the batter. The second stage is to bake the batter. To get the desired result—the cake—both stages must occur in the correct order.

Stage 1: Capturing the Sun's Energy

The first stage of photosynthesis involves capturing the energy in sunlight. In plants, this energy-capturing process occurs mostly in the leaves. Recall that chloroplasts are green organelles inside plant cells. The green color comes from pigments, colored chemical compounds that absorb light. The main photosynthetic pigment in chloroplasts is chlorophyll.

Chlorophyll functions in a manner similar to that of the solar "cells" in a solar-powered calculator. Solar cells capture the energy in light and use it to power the calculator. Similarly, **chlorophyll captures light energy and uses it to power the second stage of photosynthesis.**

Stage 2: Using Energy to Make Food

In the next stage of photosynthesis, the cell uses the captured energy to produce sugars. The cell needs two raw materials for this stage: water (H₂O) and carbon dioxide (CO₂). In plants, the roots absorb water from the soil. The water then moves up through the plant's stem to the leaves. **Carbon dioxide** is one of the gases in the air. Carbon dioxide enters the plant through small openings on the undersides of the leaves called **stomata** (stoh muh tuh) (singular stoma). Once in the leaves, the water and carbon dioxide move into the chloroplasts.

Inside the chloroplasts, the water and carbon dioxide undergo a complex series of chemical reactions. The reactions are powered by the energy captured in the first stage. These reactions produce chemicals as products. One product is a sugar that has six carbon atoms. Six-carbon sugars have the chemical formula C₆H₁₂O₆. Recall that sugars are a type of carbohydrate. Cells can use the energy in the sugar to carry out important cell functions.

The other product of photosynthesis is oxygen (O₂), which exits the leaf through the stomata. In fact, almost all the oxygen in Earth's atmosphere was produced by living things through the process of photosynthesis.

What Is Respiration?

Food supplies your body with glucose, an energy-rich sugar. Respiration is the process by which cells obtain energy from glucose. During respiration, cells break down simple food molecules such as sugar and release the energy they contain.

Storing and Releasing Energy

Energy stored in cells is something like money in a savings account. During photosynthesis, plants capture energy from sunlight and "save" it in the form of carbohydrates, including sugars and starches. Similarly, when

you eat, you add to your body's energy savings account. When cells need energy, they "withdraw" it by breaking down the carbohydrates in the process of respiration.

Breathing and Respiration

The term respiration has two meanings. You have probably used it to mean "breathing," that is, moving air in and out of your lungs. To avoid confusion, the respiration process that takes place inside cells is sometimes called cellular respiration. Breathing brings oxygen, which is usually necessary for cellular respiration, into your lungs.

The Two Stages of Respiration

Like photosynthesis, respiration is a two-stage process. The first stage takes place in the cytoplasm of the organism's cells. There, molecules of glucose are broken down into smaller molecules. Oxygen is not involved, and only a small amount of energy is released.

The second stage of respiration takes place in the mitochondria. There, the small molecules are broken down into even smaller molecules. These chemical reactions require oxygen, and they release a great deal of energy. This is why the mitochondria are sometimes called the "powerhouses" of the cell.

Trace the steps in the breakdown of glucose in Figure 16. Note that energy is released in both stages. Two other products of respiration are carbon dioxide and water. These products diffuse out of the cell. In most animals, the carbon dioxide and some water leave the body during exhalation, or breathing out. Thus, when you breathe in, you take in oxygen—a raw material for respiration. When you breathe out, you release carbon dioxide and water—products of respiration.

The Respiration Equation

Although respiration occurs in a series of complex steps, the overall process can be summarized in the following equation:

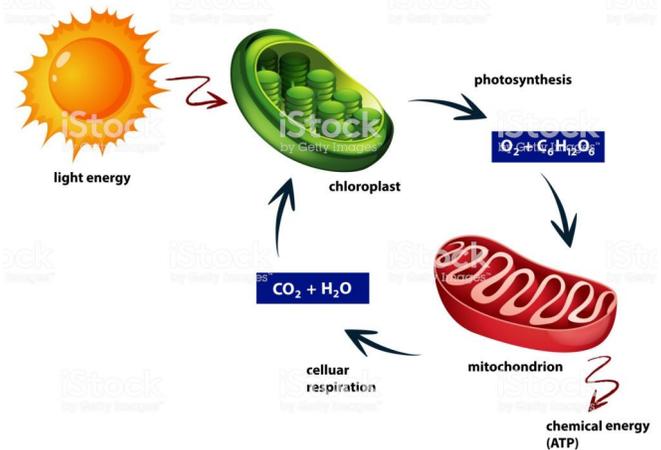
Notice that the raw materials for respiration are sugar and oxygen. Plants and other organisms that undergo photosynthesis make their own sugar. The glucose in the cells of animals and other organisms comes from the food they consume. The oxygen used in respiration comes from the air or water surrounding the organism.

Comparing Photosynthesis and Respiration

Can you notice anything familiar about the equation for respiration? You are quite right if you said it is the opposite of the equation for photosynthesis. This is an important point. During photosynthesis, carbon dioxide and water are used to produce sugars and oxygen. During respiration, the sugar glucose and oxygen are used to produce carbon dioxide and water. Photosynthesis and respiration can be thought of as opposite processes.

Together, these two processes form a cycle that keeps the levels of oxygen and carbon dioxide fairly constant in Earth's atmosphere, living things use both gases over and over again.

Cellular Respiration

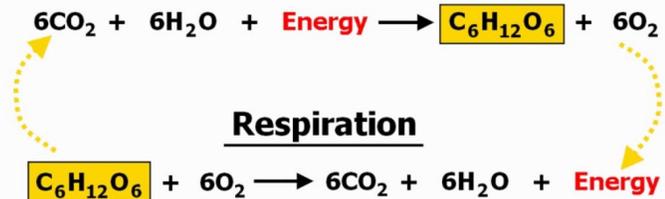


Photosynthesis VS Cellular Respiration

Photosynthesis



Respiration



Read and Respond NONFICTION

Article/Author: _____

Main Idea: _____

Three Important Facts or Statistics:

1. _____
2. _____
3. _____

One Opinion From the Article:

My Opinion About the Article:

Supporting Detail 1:

Supporting Detail 2:

Supporting Detail 3:

Author's Purpose

- Persuade
- Inform
- Entertain
- Explain
- Describe

Text Structure

- Description
- Problem & Solution
- Order & Sequence
- Cause & Effect
- Compare & Contrast

Name: _____ Date: _____ Period: _____

Is it Photosynthesis or Respiration?

Write the word equation for photosynthesis:

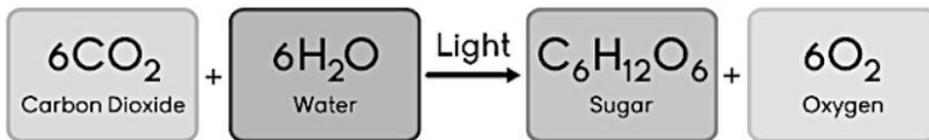
Write the word equation for cellular respiration:

Instructions: Use the clues in each question to identify whether or not that scenario is describing photosynthesis or cellular respiration.

#1. This happens in the chloroplast. _____	#2. It requires light energy. _____	#3. It produces carbon dioxide (CO ₂). _____
#4. It produces oxygen (O ₂) _____	#5. One reactant is oxygen (O ₂) _____	#6. One reactant is glucose _____
#7. It does not require light energy. _____	#8. It produces glucose. _____	#9. It produces chemical energy (ATP). _____
#10. It needs carbon dioxide (CO ₂) from the air. _____	#11. This happens in the mitochondria. _____	#12. Only plants can perform this reaction. _____
#13. Both plants and animals can perform this reaction. _____	#14. It makes water. _____	#15. It needs water. _____

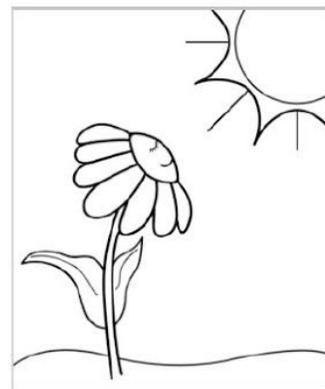
Name: _____ Date: _____ P: _____

Photosynthesis



1. List the reactants of photosynthesis and state whether or not each is a compound or element.
2. List the products of photosynthesis and state whether or not each is a compound or element.
3. (a) How many kinds of elements are used in carbon dioxide? _____
(b) Name those elements: _____
4. (a) How many kinds of elements are used in sugar? _____
(b) Name those elements: _____
5. Look at the reactants. List how many Carbons, Hydrogens, and Oxygens are on the reactant side.
6. Look at the products. List how many Carbons, Hydrogens, and Oxygens are on the product side.

7. What do you notice about the number of Carbons, Hydrogens and Oxygens in the reactants compared to the products?



Photosynthesis & Respiration Menu

Directions: Choose activities from the menu below after finishing your Reading Comprehension and worksheets for the week. You should have a total of 100 points.

25 POINTS

Week 5: Photosynthesis/Respiration - Distinguish between photosynthesis and cellular respiration and identify photosynthesis and respiration using chemical formulas.

- Define photosynthesis and respiration, in writing.
- Create a drawing photosynthesis and respiration

50 POINTS

Week 5: Photosynthesis/Respiration - Distinguish between photosynthesis and cellular respiration and identify photosynthesis and respiration using chemical formulas.

- Compare photosynthesis to respiration using a Venn diagram
- Write a journal entry from the point of view of a green plan that experiences photosynthesis and respiration
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75 POINTS

Week 5: Photosynthesis/Respiration - Distinguish between photosynthesis and cellular respiration and identify photosynthesis and respiration using chemical formulas.

- Create a skit that shows the differences between photosynthesis and respiration
- Create a test to assess the teacher's knowledge of photosynthesis and respiration.

Atmosphere Menu Work -Create a one pager. For each box not used color it in

The diagram illustrates the cycle between photosynthesis and cellular respiration. At the top left, a sun icon is labeled "Sunlight (energy)". Below it, the chemical equation for photosynthesis is given: $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{energy} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$. The word "Photosynthesis:" is written above the equation. The diagram shows a "Chloroplast" containing several stacks of thylakoids. Arrows indicate that $\text{CO}_2 + \text{H}_2\text{O}$ enters the chloroplast from the left, and O_2 exits to the right. "Glucose" is shown exiting the chloroplast downwards. Below the chloroplast is a "Mitochondrion" with internal folds (cristae). Arrows show O_2 entering from the right and $\text{CO}_2 + \text{H}_2\text{O}$ entering from the left. "Energy (ATP)" is shown exiting the mitochondrion to the left. The chemical equation for respiration is given below: $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{energy}$. The word "Respiration:" is written above the equation. The entire diagram is enclosed in a rectangular box with a folded bottom-right corner. To the right of this box is a large, empty, tilted rectangular box. Below the photosynthesis/respiration box is another large, empty, tilted rectangular box. At the bottom right of the page is a smaller, empty rectangular box with a folded bottom-right corner.