

PHOTOSYNTHESIS AND RESPIRATION

Hi Friends

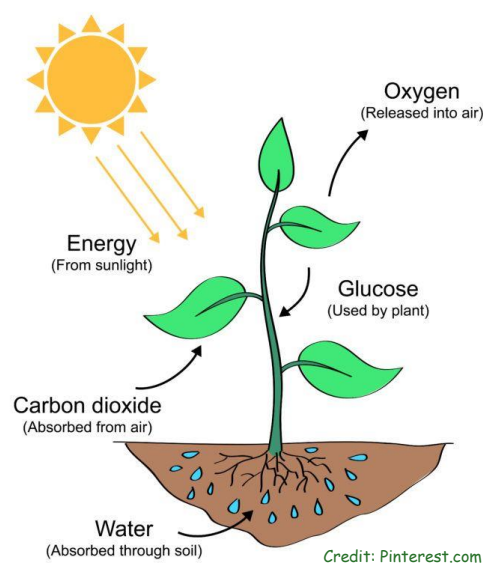
Every time we meet on this platform it means it is an information sharing session. This time is no different because we will be sharing information on two biological terms called **photosynthesis** and **respiration**. All living organisms, ranging from microscopic to the biggest land animal (the elephant), require energy for their daily activities which enables them to survive. Unfortunately not all of those organisms are able to manufacture their own food.

WHAT IS PHOTOSYNTHESIS?

Plants are the only organisms referred to as photoautotrophs. This means that they are able to make their own energy using light and carbon dioxide during the process of photosynthesis. Plants are not like animals that have to look for food to give them energy. For example, herbivores eat plants to obtain their energy whilst carnivores eat herbivores (meat) to obtain their energy. The process of photosynthesis is made possible by the three basic parts of a plant namely: roots, stem and leaves. Each of the parts have special functions. The roots anchor and absorb water from the ground; the stem supports the plant above the ground; and the leaves collect sunlight energy and carbon dioxide to manufacture the plants food through photosynthesis.

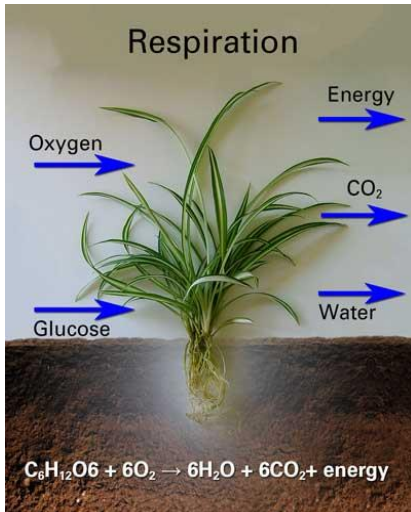
How do plants manufacture their own food?

A plant will absorb water available in the ground through its roots. The water will move upward into the xylem vessels to the leaves (this process is known as transpiration pull). Inside the leaves, water will enter the chloroplast cells which are made up of green pigments called chlorophyll (chlorophyll gives the leaf a green colour which reflects green wavelengths). The chlorophyll will absorb the light through its blue and red parts using a chemical reaction. Chlorophyll molecules inside the chloroplast absorb a single photon from light in exchange for electrons and a chemical reaction takes place. Oxygen atoms in the water will separate from hydrogen atoms and be released as waste. Carbohydrate molecules will then be formed from the remaining hydrogen atoms. In the leaf stroma, carbon dioxide will split into carbon and oxygen and the oxygen will be released as waste to allow the combination of hydrogen and carbon to form simple sugar. This is then food for the plant.



WHAT IS RESPIRATION?

Respiration is a metabolic process where an organism obtains energy within their living cells. Oxygen is taken in while carbon dioxide is released from the oxidation of complex organic substances. Respiration is divided into two types namely, anaerobic and aerobic respiration.

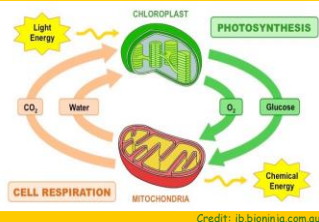


Credit: versaperm.com

Anaerobic respiration	Aerobic respiration
Oxygen absent.	Oxygen present.
Takes place in the cytoplasm.	Takes place in both cytoplasm and mitochondria.
Gaseous exchange absent.	Gaseous exchange present.
Glucose is broken down into energy, carbon dioxide and ethyl alcohol.	Glucose is broken down into carbon dioxide and water.
It happens in muscles during exercise.	It happens in plant cells and other microorganisms.
It involves glycolysis and fermentation.	It involves glycolysis, tricarboxylic acid cycle and respiratory chain.
Less energy is being produced.	More energy is being produced.

WHAT IS THE DIFFERENCE BETWEEN PHOTOSYNTHESIS AND RESPIRATION?

Photosynthesis	Respiration
Happens in plants.	Happens in both plants and animals.
Energy is stored.	Energy is released.
Happens during the day.	Happens during both day and night.
Endothermic.	Exothermic.
Radiant energy is converted into potential energy.	Potential energy is converted into kinetic energy.
Food is synthesised.	Food is oxidised.
Products are oxygen, sugar and water.	Products are hydrogen and carbon dioxide.



Hopefully by reading this article you now have a better understanding of what photosynthesis and respiration are and how they differ from each other. We hope that you see that water is also an important part of life processes and for that reason we should always respect and conserve water as a resource.

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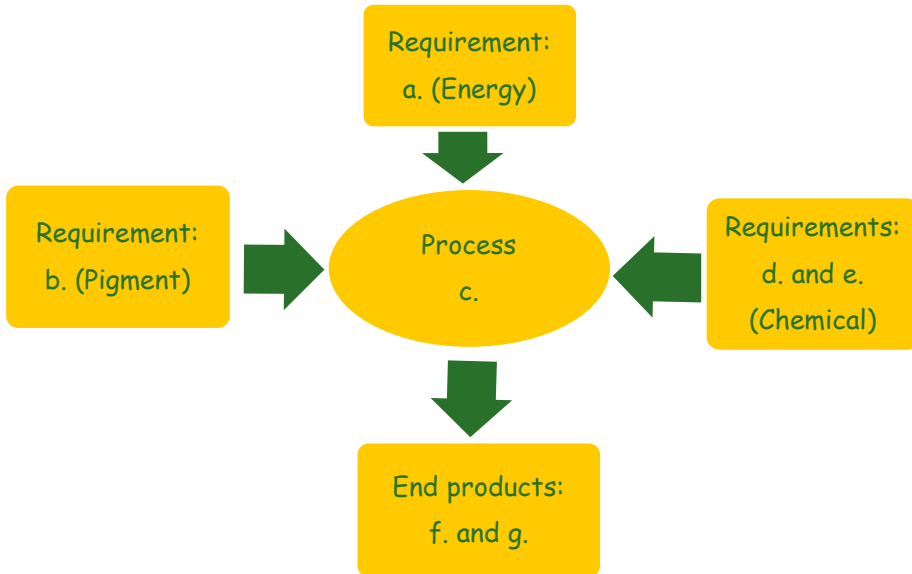


References for Newsletter:

- biology.chapter/overview-of-photosynthesis/
- <https://en.wikipedia.org/wiki/Respiration>
- <https://www.bbc.co.uk/bitesize/topics/zvrrd2p>
- <https://courses.lumenlearning.com/boundless>
- <https://simple.wikipedia.org/wiki/Respiration>
- <https://www.mbgnet.net/bioplants/food.html>

PHOTOSYNTHESIS AND RESPIRATION ACTIVITY

1. Complete the following diagram. First start with the "process" at letter c (centre):



Write your answers here:

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____
- g. _____

2. State whether each statement below is true (T) or false (F).

STATEMENT	T/F
a. The movement of oxygen from the outside environment into the cells within tissues whilst carbon dioxide is released is known as transpiration.	
b. "Photoautotroph" refers to animals that are able to manufacture their own food.	
c. The pigment that gives a plant leaf a green colour is referred to as chlorophyll.	
d. During respiration the potential energy is converted into radiant energy.	
e. One of the differences between photosynthesis and respiration is that photosynthesis takes place at night.	
f. Anaerobic respiration takes place in the absence of oxygen.	
g. The chemical formula of water is H ₂ O. During photosynthesis the 2 hydrogen and 1 oxygen atoms split.	
h. Respiration takes place in both plants and animals while photosynthesis only takes place in animals.	
i. One of the primary functions of plant roots is to absorb water from the ground into the plant.	
j. Aerobic respiration takes place in mitochondria and also in the cytoplasm.	

Answers:
 1a. Sunlight 1b. Chlorophyll 1c. Photosynthesis 1d. Water
 1e. Carbon dioxide 1f. Oxygen 1g. sugar
 2a. F 2b. F 2c. T 2d. F 2e. F 2f. T 2g. T 2h. F 2i. T 2j. T



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