

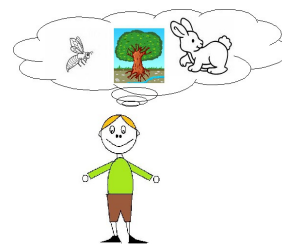
## Lesson 4

## ENERGY IN ANIMALS AND IN PLANTS

### 1. VITAL FUNCTIONS

What are living beings/things?

Living beings/things are those with life. This means that they perform a series of activities that allow them to live and adapt to the environment. All living beings perform these activities. These activities are called vital functions and they are as follows:



### VITAL FUNCTIONS

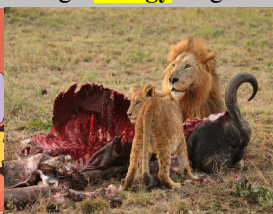
#### REPRODUCTION:

Life originates new beings like them, through different procedures.



#### NUTRITION:

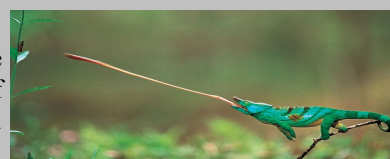
They eat to get **matter** and enough **energy** to grow



<http://www.supersaber.com/zoo3.swf> <http://www.supersaber.com/digestivo.htm>

#### RELATIONSHIP:

They react to the information they receive from the environment around them, responding to stimuli of other living beings. It is used to find food and avoid dangers



**Activity 1.** Complete the following sentences with the correct word.

The functions of a living being are three:

- \_\_\_\_\_ provides the living being matter to repair itself and grow, and helps \_\_\_\_\_ to perform vital functions and move.
- \_\_\_\_\_ provides information from the environment through the sense organs. This information allows living beings to find food and avoid dangers.
- \_\_\_\_\_ is used to create new bodies to replace those that die.

**Activity 2.** What do animals need to eat ? Do animals need to breathe?

**Activity 3.** What do plants need to feed? Do plants need to breathe?

What vital function is working here?

**Activity 4.** Explain all the ways you know how a deer (ciervo) could detect the presence of a predator (wolf).

What will the deer do when it detects the wolf?

What vital function is working here?

**Activity 5.** Explain all the ways you know of how a gazelle could find the herb necessary to feed itself.


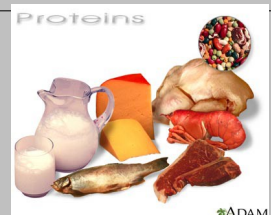
What would happen to a gazelle that could not find its food?.

**Activity 6.** Could insects, jellyfish and other small organisms identify sudden temperature changes? How?

What do they do if they detect a temperature rise? What would happen to them if they could not detect it?.

## 2. THE COMPOSITION OF LIVING BEINGS.

As we saw, living beings have the same functions. And also animals and plants are composed of the **same** substances, they have the same chemical composition: [library.thinquest](http://library.thinquest)

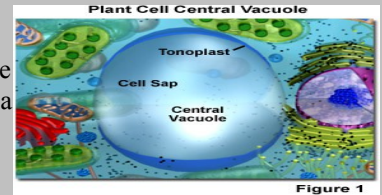
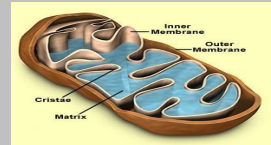
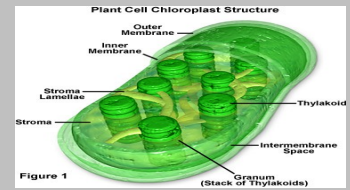
THE MATTER OF LIVING THINGS	INORGANIC SUBSTANCES	<p><b>WATER</b></p> <ul style="list-style-type: none"> <li>- Water is vital both as a solvent where many of the body's solutes dissolve and as an essential part of many metabolic processes within the body.</li> <li>- Water is also essential to photosynthesis and respiration.</li> <li>- Water is also important to eliminate waste substances and regulate body temperature (urine, sweat).</li> </ul>	
		<p><b>MINERAL SALTS</b></p> <p>Each mineral is necessary even in tiny (very small) quantities. It is indispensable for important life functions; they are needed for the formation of hormones, enzymes and other body substances.</p>	
	ORGANIC SUBSTANCES (made of C, H, O and N mainly)	<p><b>CARBOHYDRATES ( " Sugar" )</b></p> <ul style="list-style-type: none"> <li>- Living beings use them to obtain <b>energy</b> and to form <b>structures</b>.</li> <li>- Examples: glucose ( energy ) and cellulose (structures)</li> </ul>	
		<p><b>LIPIDS ( "fats" )</b></p> <ul style="list-style-type: none"> <li>- Energy storage.</li> <li>- Acting as structural components of cell membranes. .</li> <li>- They are part of molecules such as cholesterol and vitamins (such as A, D, E and K).</li> </ul>	
		<p><b>PROTEINS</b></p> <ul style="list-style-type: none"> <li>- They regulate vital functions (enzymes).</li> <li>- They transport substances (hemoglobin).</li> <li>- They defend against infections (immune system).</li> <li>- They form structures (muscles ...).</li> <li>- They are part of some hormones like insulin.</li> </ul>	
		<p><b>DNA</b></p> <p>Contains the genetic instructions and the hereditary information used in the development and functioning of all known living organisms.</p>	

**Activity 7.** Indicate which of the following substances are organic or inorganic: butter, water, minerals, protein, meat, stones, sugar, iron, air, milk.

ORGANIC SUBSTANCES	INORGANIC SUBSTANCES
Meat	

**Living beings/things** are formed by the same basic units called cells.

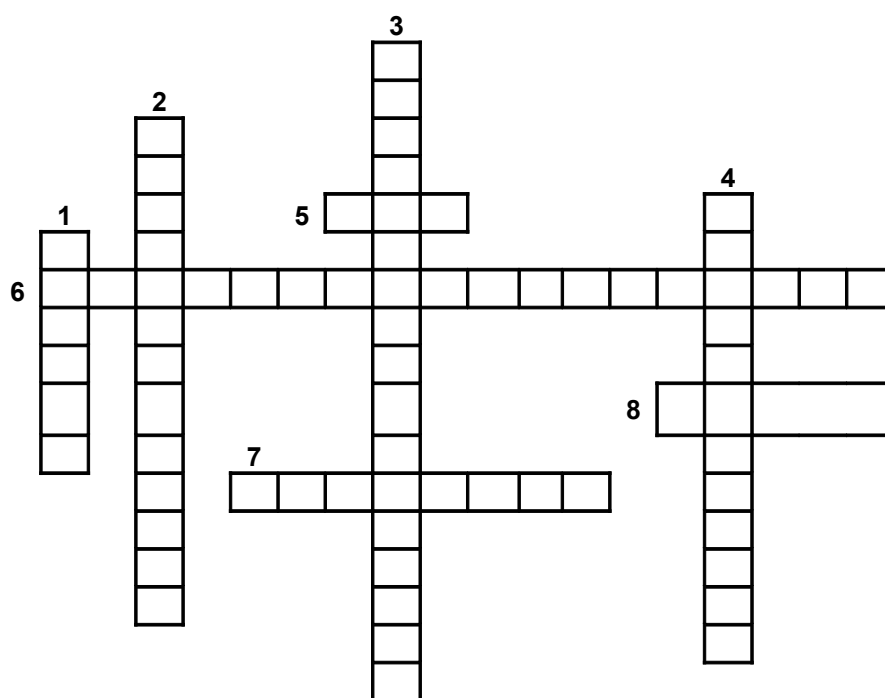
The cell is the structural and functional unit of all known living organisms. It is the smallest unit of an organism that is classified as living. The cell is the smallest living unit with the ability to feed itself, interact, and reproduce.

PART OF THE CELLS	<p><b>Plasma membrane or cell membrane:</b> It wraps (envuelve) the cell and regulates the entry and exit of substances. In plant cells, there is often also another coarse and rigid membrane, made up of cellulose, called <b>cell wall</b> that gives the cells support and rigidity.</p>	
	<p><b>Cytoplasm:</b> Space inside the cell, and it is the area where most cell activities take place and the matter in which the <b>organelles</b> (small organs) are embedded, such as vacuoles, mitochondria, chloroplasts, and the nucleus.</p>	
	<p><b>Vacuoles:</b></p> <p>They may be a reservoir for fluids that the cell will excrete to the outside or they may be filled with storage products. Plants cells usually have a large central vacuole.</p>	 <p>Figure 1</p>
	<p><b>Mitochondrias:</b></p> <p>They create <b>energy</b> for the cell.</p>	
	<p><b>Chloroplasts:</b></p> <p>They are only in the cells of green plants and green algae that contain chlorophylls ( green pigment )and carry out <b>photosynthesis</b>.</p>	 <p>Figure 1</p>
	<p><b>Nucleus:</b></p> <p>It controls and regulates the cell's activities and carries <b>DNA</b> and genes.</p>	<p><b>Prokaryotic cells:</b></p> <p>These cells <b>DO NOT have</b> a nucleus and genetic material is dispersed in the cytoplasm. Example: <b>Bacteria</b>.</p> <p><b>Eukaryotic cells:</b></p> <p>These cells <b>have</b> a nucleus. Example: <b>Animals and plants</b>.</p>

### Activity 8.

### CROSSWORDS

1. Stored as reserve energy and form structures.
2. Living beings use them to obtain energy and to form structures.
3. Complementarily, most OF THEM are traditionally viewed as being of biological origin.
4. They are naturally- occurring elements needed by the body and its vital activities.
5. They contain the hereditary information.
6. Traditionally, THESE compounds are considered to be of a mineral, not biological, origin.
7. They regulate vital functions, transport substances, defend against infections, form structures.
8. All known forms of life depend on it. For example , a human body contains 60–70% of it



**Activity 9.** When an athlete is exhausted (very tired), what should he/she eat to recover quickly, a sausage sandwich ( fat ) or a sugary drink?

Why?.

**Activity 10.** Why should animals, as bears, eat too much fat in summer to hibernate (sleep) during the winter?.

**Activity 11.** Why do many animals that live in cold places (bears, whales, seals ,...) have large reserves of fat?.

**Activity 12.** Many aquatic birds have special glands that produce oils for their feathers. Why ?

What would happen to them if they didn't do it?.

**Activity 13.** The immune system (defense) of living beings is built with proteins. What would happen to a living being with few "defenses"?

**Activity 14.** Patients with a low immune system are in isolation rooms. Why?.

**Activity 15.** Many anti-wrinkle creams contain a protein called collagen. Why?.

**DATA:** Collagen is a protein that serves as support to the muscles, giving them elasticity.

**Activity 16.** Fill in the following chart , using information found on the Internet or in books

**link 1** : <http://revista.consumer.es/web/es/20050101/alimentacion/>

MINERAL	FUNCTION	DEFICIENCY
<b>Fósforo</b>	Actividade nerviosa, muscular. Forma parte de ósos e dentes	Debilidade, fraxilidade ósos
<b>Calcio.</b>		
<b>Sodio</b>		
<b>Hierro (Iron)</b>		
<b>Yodo</b>		
<b>Potasio</b>		
<b>Magnesio</b>		

**Activity 17.** People with anaemia are low in iron and they can not make hemoglobin (protein). Why are these people always tired?.

**Activity 18.** People who do not eat food with calcium (milk, cheese, etc. ..), have brittle (quebradizo) bones, why?.

**Activity 19.** The genes of our cells contain DNA that allows them to make proteins for the correct functioning of our body. A defective gene causes diseases because it cannot make certain proteins. People with hemophilia have a genetic disease that prevents (impedir) them from making the protein needed for blood clotting (coagulación) . What could happen to these people if they have an accident?.

**Activity 20.** Indicate the function of the following organelles:

ORGANELLE	FUNCTION
Mitochondrias	
Vacuole	
Chloroplast	

**Activity 21.** What is the difference between eukaryotic cells and prokaryotic cells?

Which ones are bigger ?

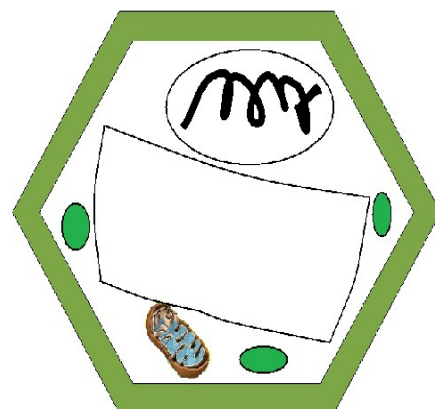
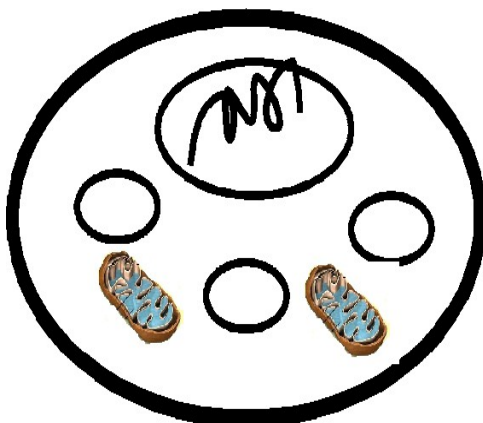
Why?

**Activity 22.** Where do eukaryotic cells have genetic material ( DNA) ?

And prokaryotic cells ?

**Activity 23.** Indicate the main differences among plant cells and animal cells.

**Activity 24.** Indicate the organelles and parts of the following cells. Indicate also which is a plant cell and which is an animal cell.





### 3. NUTRITION

There are two types of nutrition:

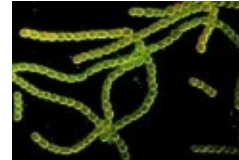
**Autotroph nutrition:** Synthesizes organic substances from simple inorganic substances ( $H_2O$ ,  $CO_2$  and minerals) which they take from the ground and atmosphere, using energy from the sun ( photosynthesis) or through chemical reactions. Example: **Plants, algae and some bacteria.**



**Plants**



**Algae**



**Bacteria**

**Heterotroph nutrition:** Ingests organic material already formed from other living beings or from the remains of living beings. Example: **Animals, fungi and most microorganisms.**



**Animals**



**Fungi**



**Microorganisms**

### 4. ANIMAL FEEDING

Living beings can be divided into several feeding types:

<b>FEEDING</b>	<p><b>Herbivores:</b></p> <p>They eat plants and plant products.</p> <p>(Ex: Cow, horse, butterfly, grasshopper (saltamontes), snail (caracol), deer (ciervo), bee (abeja), etc... )</p>	
	<p><b>Carnivores:</b></p> <p>They eat other animals.</p> <p>( Ej: Lion, tiger, cat, dog, spider, wasp, crocodile, shark, scorpion, frog, etc...)</p>	
	<p><b>Omnivores:</b></p> <p>They eat whatever they can find.</p> <p>(Ej: ant, human, pig, , wild boar (jabalí), bear, cockroach (cucaracha), etc...)</p>	
	<p><b>Filterers:</b></p> <p>They feed by siphoning and filtering large particles from water.</p> <p>( Ej: Oyster (ostra), mussel (mejillón), clam (almeja), whale, etc..)</p>	

**Actividad 26.** Fill in the following chart:

LIVING THING	NUTRITION	LIVING THING	NUTRITION
Apple tree	Autótrofa	Ant	
Lion		Palmera	
Seta		Horse	
Rosal			Autótrofa
Alcornoque			Heterótrofa
Cow		Hongo	

**Actividad 27.** Fill in the following table :

ANIMAL	FEEDING	ANIMAL	FEEDING
León	Carnívoro	Shark	
Cow			Filtrador
Caracol			Herbívoro
Humano			Carnívoro
Almeja			Omnívoro
Jabalí		Cat	
Horse		Abeja	
Avispa		Spider	

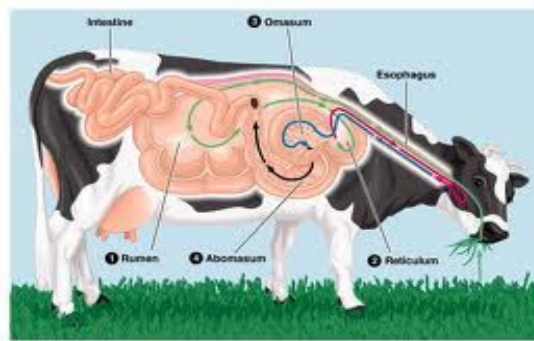
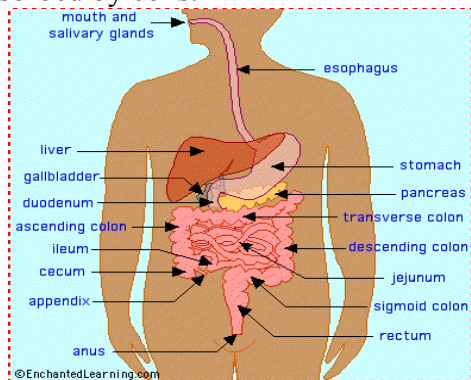
**Actividad 28.** Complete the sentences :

- A cow is a \_\_\_\_\_ animal because it eats grass.
- \_\_\_\_\_ animals can eat vegetables and meat..
- Carnivorous animals \_\_\_\_\_
- \_\_\_\_\_ animals eat by siphoning and filtering large particles from water

## 5. DIGESTION

[AMPLIACIÓN VIDEO YOUTUBE](#)

**Digestion** is the conversion of food into small substances called nutrients that can be absorbed by cells.



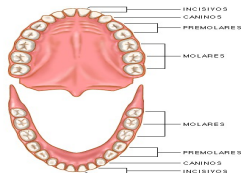


Primitive animals have no digestive system or have a very simple one due to the simplicity of their bodies, so nutrients can go directly to the cells. However, most animals have a digestive system that has several parts:

- **A mouth** : Food is introduced into the mouth and it is often crushed there.
- **A stomach**: Where digestion begins.
- **Intestines**: Digestion is completed and nutrients are absorbed into the blood. Carnivorous animals have it shorter because meat contains more nutrients than vegetables.
- **An anus**: Substances that cannot be digested are expelled in the feces.

Digestion has two parts:

- **Mechanical digestion**. Food is crushed in the mouth, beak, claw, etc...



- **Chemical digestion**. Food is transformed by digestive juices.



**Activity 29.** Why is a cow intestine much longer than a lion one?.

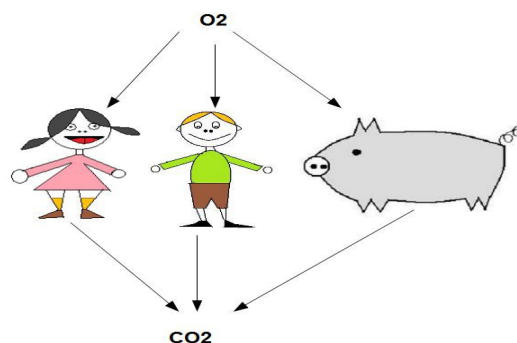
**Activity 30.** Why don't a spider, a fly or a clam have a mechanical digestion?.



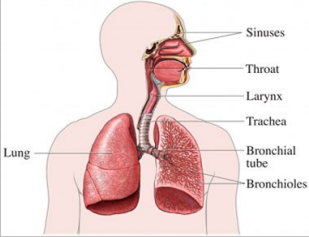
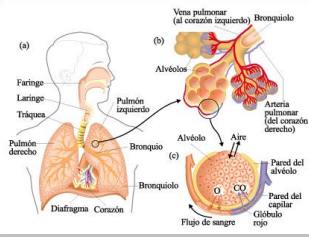
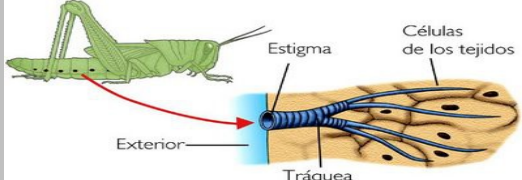
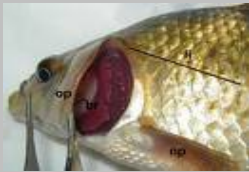
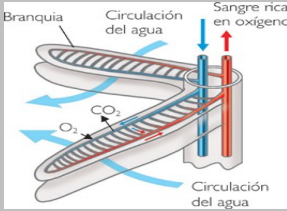
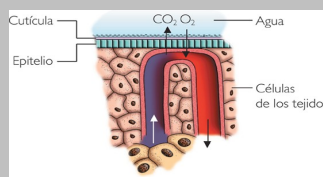

## 6. RESPIRATION

[AMPLIACIÓN](#) [VIDEO YOU TUBE](#)

Animals exchange gases with the outside, they absorb oxygen and expel carbon dioxide. This process produces **energy** to be used by their cells.



There are several types of breathing:

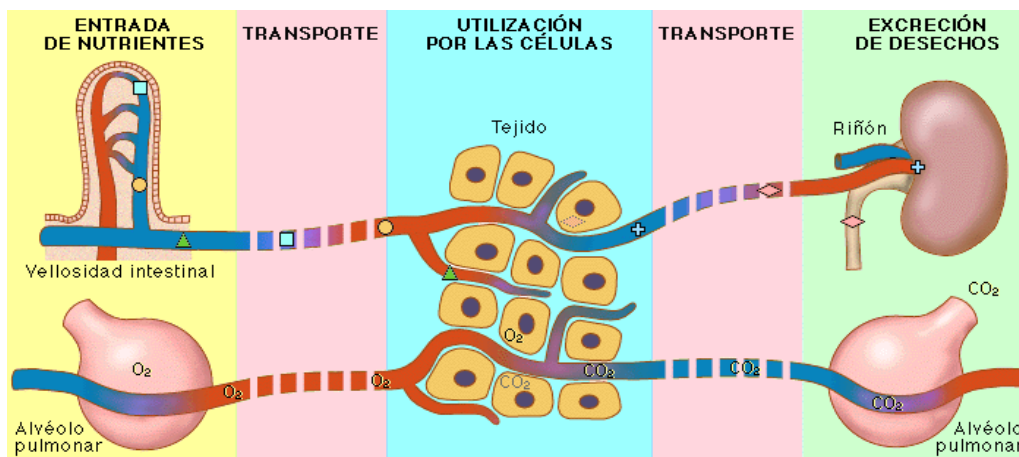
BREATHING	
<p><b>Lungs (pulmóns):</b> They are big bags that allow them to breathe oxygen air directly. <b>Ex: Mammals, reptiles, amphibians, birds, snails, etc..</b></p>  	<p><b>Invertebrate trachea:</b> They are small tubes developed by many arthropods (small animals) which lead the air directly into their bodies, through holes. Their internal organs absorb this atmospheric air. <b>Ex: insects, and arachnids.</b></p> 
<p><b>Gills (branquias):</b> They allow to breathe oxygen dissolved in water. <b>Ex: Fish, crustaceans and most of aquatic animals.</b></p>  	<p><b>Skin :</b> Some <b>aquatic animals</b> (frogs) or <b>small animals</b> (worms) can breathe simply by exchanging gas through the surface of their body. Their skin must be moist. <b>Ex: Amphibians, worms, etc...</b></p>  

**Activity 31.** Why cannot big animals breathe only with the trachea as insects?

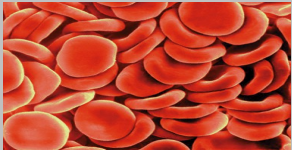
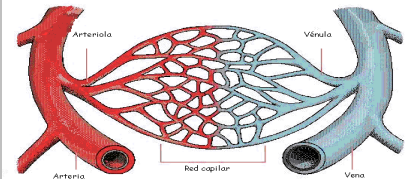
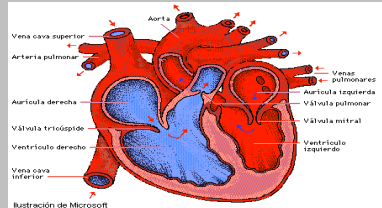
## 7. CIRCULATORY SYSTEM.

[AMPLIACIÓN VIDEO YOUTUBE](#)

The **circulatory system** carries the **oxygen** and **nutrients** that cells need and it removes the **carbon dioxide (CO<sub>2</sub>)** and **waste substances** that they produce.



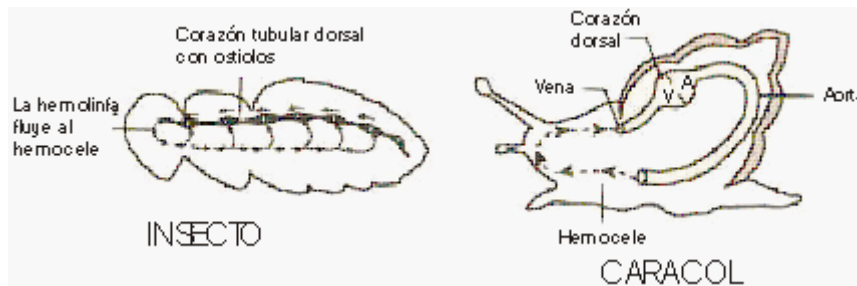
## CIRCULATORY SYSTEM CONSIST OF

<p><b>Blood:</b> It is the liquid in which substances are transported.</p> 	<p><b>Blood vessels:</b> (Vasos sanguíneos). They are tubes through which blood flows.</p> 	<p><b>Heart:</b> It pumps and pushes blood.</p> 
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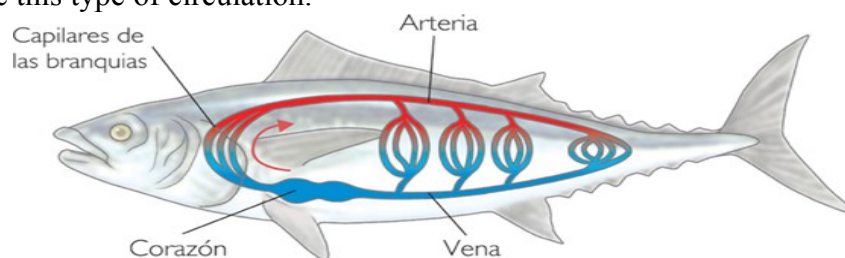
The circulation may be:

## EXAMPLES

- **Opened.** The blood leaves the blood vessels to flow directly to the cells. Only small animals such as insects, spiders, molluscs, etc have this type of circulation.



- **Closed.** The blood always circulates inside the blood vessels. Annelids, cephalopods, and vertebrates have this type of circulation.



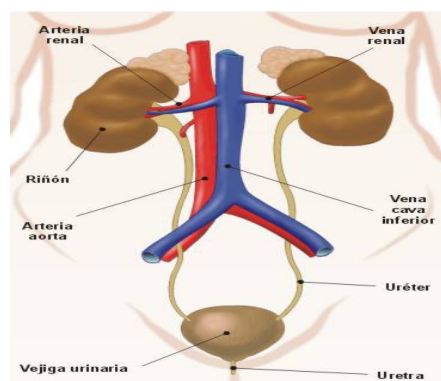
## 8. EXCRETION

AMPLIACIÓN

VIDEO YOUTUBE

It is the expulsion of waste substances to the outside.

- **Carbon dioxide** is eliminated through the lungs.
- **The kidneys (riñones)** filter blood and produce urine with waste substances.
- The **sweat** also removes waste substances.



**Activity 32** What is dialysis?. Look it up on the internet

## REVIEW:

### Animals can be born in two ways:

**Oviparous:** They are born from eggs.



**Viviparous:** They are born directly from the mother's body.



### METABOLISM (Como controlan a temperatura do seu corpo).

**Ectotherms:** They cannot regulate their own body temperature. Their body temperature depends on the external temperature (**cold-blooded**).



**Endotherms:** Their body temperature is kept constant (**warm-blooded**).



## POSIBLES TRABAJOS EN GRUPOS:

1) Elaborar fichas das sales minerais que necesita o corpo humano, en qué alimentos se atopan e enfermidades que provoca a súa ausencia.

[http://www.eat-online.net/english/education/food\\_mineral\\_salt.htm](http://www.eat-online.net/english/education/food_mineral_salt.htm)

[http://en.wikipedia.org/wiki/Mineral\\_salt](http://en.wikipedia.org/wiki/Mineral_salt)

<http://library.thinkquest.org/C005969/mineralsalts.htm>

2) Importancia do auga para os seres vivos. Por qué é importante que o xeo flote sobre o auga para os seres vivos.

<http://www.kidsgeo.com/geography-for-kids/0132-water-is-important-to-lifer.php>

<http://es.answers.yahoo.com/question/index?qid=20090201083505AAR7oW9>

# NUTRITION IN PLANTS

## 1. PLANTS.

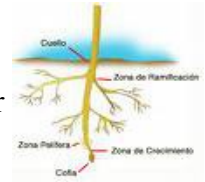
Plants are **living things**. Their main characteristics are:

- a) They are **autotroph**. They make their own food by photosynthesis.
- b) **They cannot move**, so they live fixed to the ground.

## 2. PARTS OF THE PLANTS

Most plants have the following parts:

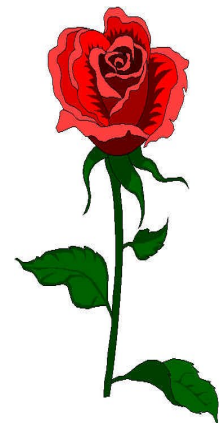
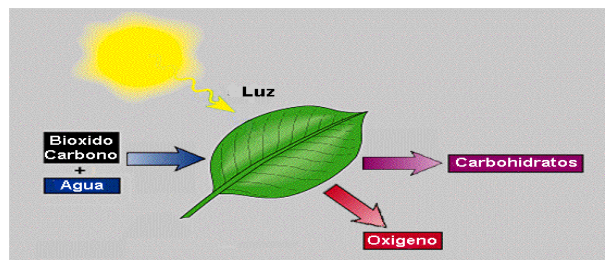
a) **Roots:** They absorb water and minerals. They serve as support for the plant.



b) **Stem or trunk (trees) :** It provides support to plants. Its cell structure is designed to carry water and salts from the roots to the leaves and sugars from the leaves to the roots.



c) **Leaves(in singular, leaf):** The leaves produce food through **photosynthesis**.



d) **Flowers:** They contain the reproductive organs of plants.

[ANIMATION](#)

### Activity 1. Match

Roots	They support and serve to transport substances.
Stems	They absorb water and minerals.
Leaves	They perform photosynthesis.
Flowers	They contain the reproductive organs of plants.

### Activity 2. Indicate if the following sentences are **true or false**:

Frogs can do photosynthesis because they are green.	
All plants do photosynthesis.	
Photosynthesis can be done both day and night.	
Fungi can do photosynthesis	



### 3. PHOTOSYNTHESIS .

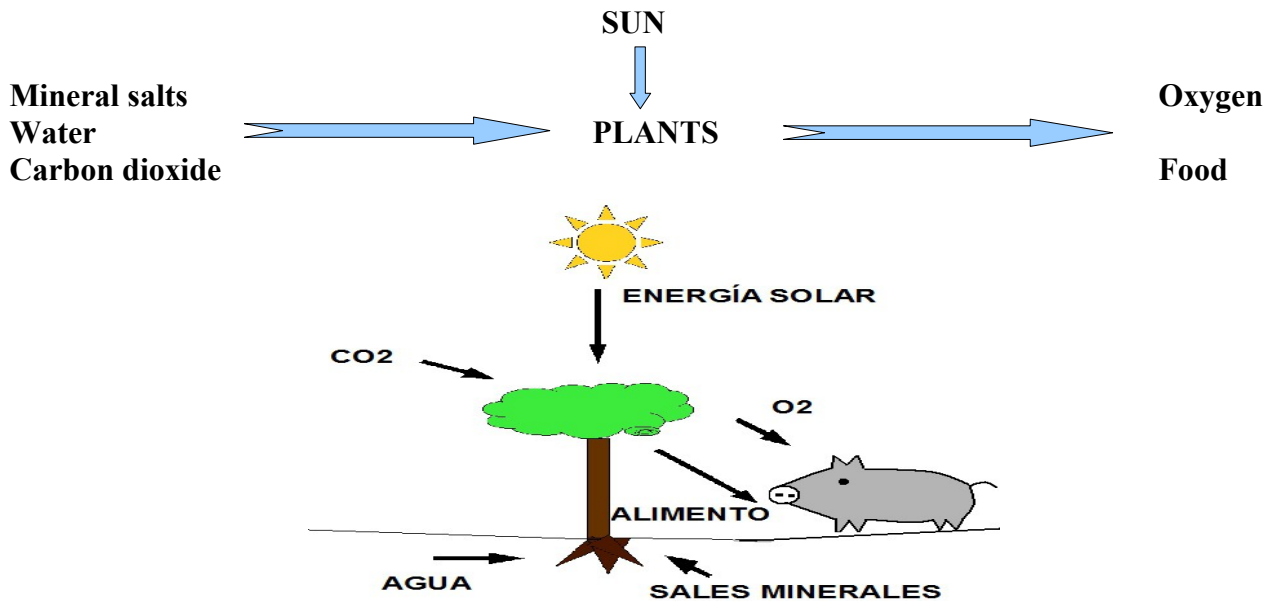
The plants get their green colour from **chlorophyll**, a **green** pigment, which is located inside the cells. **It collects energy from the sunlight.**

The plants feed on water, mineral salts and carbon dioxide and they use solar energy :

a) To **make their own food.**

b) To **create oxygen** that animals need to breath.

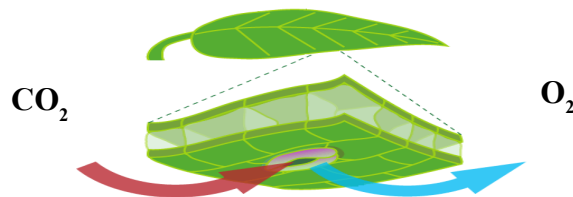
This process is called **photosynthesis** and animal life depends on it



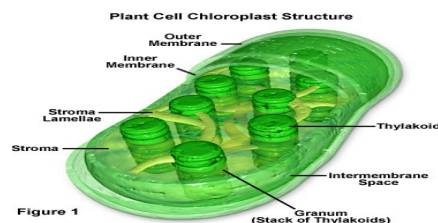
Plants absorb **mineral salts and water** from the **ground** and they are absorbed through the root hairs (**pelos absorbentes**) of the root.

Plants take **CO<sub>2</sub>** from the **air** and it is absorbed through small holes (**estomas**) placed on their leaves.

Plants **expel O<sub>2</sub> and water** (transpiration) to the air through small holes (stomas) (**estomas**) placed on their leaves.



Photosynthesis is performed by the **chloroplasts** located inside of the plants cells.



**Activity 3.** Could animals live without plants?.  
Why ?

**Activity 4.** A lion is carnivorous and it does not eat plants. If there were no plants, could lions live?  
Why ?



**Activity 5.** Is it good to burn and destroy large areas of forests?

Why? ( Indicate, al least two reasons)

**Activity 6.** Humans use plants to: (Choose the correct answers)

- a) As fuel to generate heat (ex. Wood);      b) To produce the oxygen we breathe.
- c) To produce clothes (ex. wool and cotton to manufacture carpets and sweaters).
- d) To produce food (ex. lentils, melons, wheat (trigo) , bread ..).
- e) To please our friends (ex. giving flowers on Valentine's day)
- f) To produce medicine (ex. quinine for malaria); g) The plant roots help to prevent erosion.
- h) All are correct.

**Activity 7.** Having a look at activity 6. Do you think the plants are valuable or something you can easily do without? Why ?

**Activity 8.** Why are they trying to build large parks with trees in big cities?

**Activity 9.** Explain the process of photosynthesis and why it is useful.

**Activity 10.** Could there be plants in caves or deep in the sea? Why ?

**Activity 11.** 65-million years ago (the time of dinosaurs), a meteor crashed into the Earth. Afterward the Earth was covered with a layer (capa) of dust (polvo) that darkened the air for two years. What happened to the plants during that time?

What happened to the dinosaurs and large animals? Why?

**Activity 12.** Filling the gaps:

Plants use \_\_\_\_\_ from the \_\_\_\_ by a green substance called \_\_\_\_\_ to do \_\_\_\_\_. In this process, plants absorb water and minerals by the roots, producing \_\_\_\_\_ and \_\_\_\_\_ necessary for animal life.

**Activity 13.** Indicate if the following sentences are **true or false**, and try to explain why:

Frogs can do photosynthesis because they are green.	
All plants do photosynthesis.	
Photosynthesis can be done both day and night.	
Fungi can do photosynthesis	
Terrestrial plants produce more oxygen than algae	
Plants are useful for the living beings.	

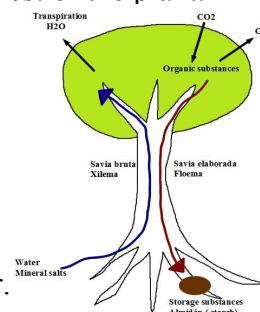
#### 4. THE TRANSPORT OF SUBSTANCES WITHIN THE PLANTS

Mineral salts and water must reach the leaves so that they can do photosynthesis. On the other hand, organic substances ( food ) made in the leaves should reach other parts of the plants. This makes it necessary to have a transport of substances within the plant .

Sap (savia) is a fluid transported within the plants. There are two types of sap:

a) Xylem sap (**savia bruta**) consists primarily of water and mineral salts. This liquid flows through vessels called xylem (**xilema**) from the roots towards the leaves.

b) Phloem sap (**savia elaborada**) consists primarily of water with organic substances. It flows through vessels called phloem (**floema**) from the leaves towards the rest of the plant.



**Activity 14.** Match the following sentences:

**Xylem**

Storage substance of the plants.

**Phloem**

An intelligent girl with rude or brute behaviour.

**Starch ( almidón)**

Where the xylem sap flows.

**Savia bruta**

Liquid with organic substances that flows from the leaves toward the rest of the plant.

**Sabia bruta**

Where the phloem sap flows.

**Savia elaborada**

Liquid with water and mineral salts that flows from the roots toward the leaves.

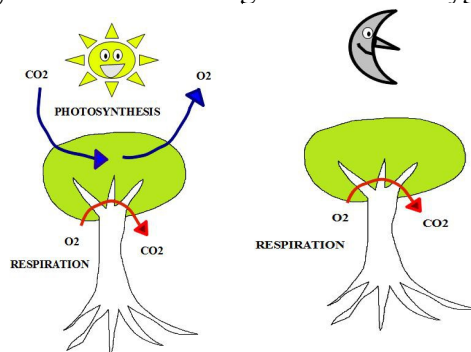
## 5. RESPIRATION IN PLANTS

Plants **breathe** oxygen and expel carbon dioxide like other living things during the day and night.

Plants perform **photosynthesis** absorbing carbon dioxide and expelling oxygen only during the day.

Of course, the amount of oxygen produced in photosynthesis is much higher than the oxygen consumed in respiration and is sent into the atmosphere.

**Activity 15.** If plants consume oxygen to breathe, how is it possible that they produce oxygen that animals need to breath ?



**Activity 16.** Is it a good idea to sleep surrounded by a lot of plants in a closed room ?.

Why ?

## 6. CARNIVOROUS PLANTS

### AMPLIATION

Some plants that live in soils poor in minerals hunt small animals to supplement their diet.



**Activity 17.** What advantages does a carnivorous plant obtain eating insects? . Where are usually located?.

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