



SCIENCE
with me!®

Starting reactions
that last a lifetime®

INTRODUCTION TO **PLANTS**



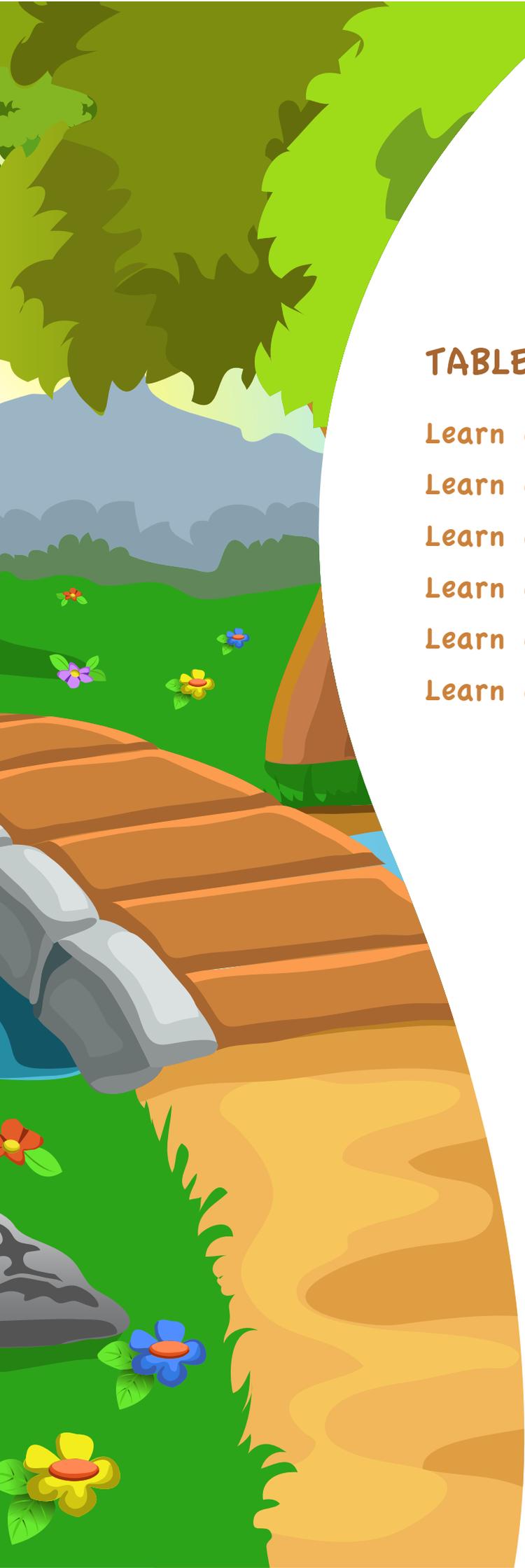


TABLE OF CONTENTS

Learn about LEAVES

Learn about THE PLANT CELL

Learn about PHOTOSYNTHESIS

Learn about TRANSPORT IN PLANTS

Learn about SEEDS

Learn about POLLINATION

LEARN ABOUT LEAVES

What is a leaf?

Leaves are the plants food factory. A leaf is a flat, thin plant organ that uses the sun to make its own food. In general leaves are green and use the chemical called chlorophyll to trap energy from the sun. This process is known as Photosynthesis. The energy is used to combine water from the soil and carbon dioxide gas from the air to make sugar. Oxygen is released during this process a process called Respiration. The leaf acts almost like a solar panel for attracting energy from the sun. Leaves are prominent in the human diet as leaf vegetables like lettuce. You may not realise it but we eat some form of leaf almost every day...well I know I do!

What are the types of leaves?

Most leaves are flat to increase absorption from the sun although this is not always the case. The main flat area is called the blade or lamina. Not all leaves are flat but most are. A simple leaf has an undivided blade. A compound leaf has a fully subdivided blade with is separated by a main or secondary vein.

What is a plant?

A living thing that usually can produce its own food, reproduces, and rarely is able to move by itself. Many (although not all) plants are green and are part of our ecosystem. A plant is what the leaf is attached to.

What are the parts of a plant?

The plant is made up of three parts.

The Leaves – are basically a food making machine.

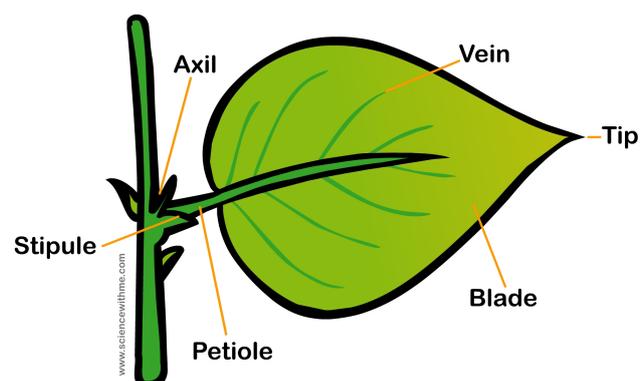
The Stems – The stems are the plant's support system. Stems hold up leaves to the light and keep fruits and flowers attached. They grow straight up, trail along the ground, climb fences and trees or stay underground.

The Roots – the roots are the plants anchor and hold the plant firmly in the ground. Roots are also absorbers of water and minerals from the soil. The also store minerals.

What are the parts of a leaf?

There is awesome variety in leaf structure and some may have all or few of the following parts. The main flat area is called the blade or lamina. Small processes located to either side of the base of the petiole are called the stipule. In some leaves there is no stipule for example. Nearly every leaf has a leaf stalk. The leaf stalk is called the petiole. The petiole attaches to the stem at a point called the leaf axil. Leaves can store food, water and minerals and these are transported through the veins and stem.

LEAF PART NAMES



What are the layers of a leaf?

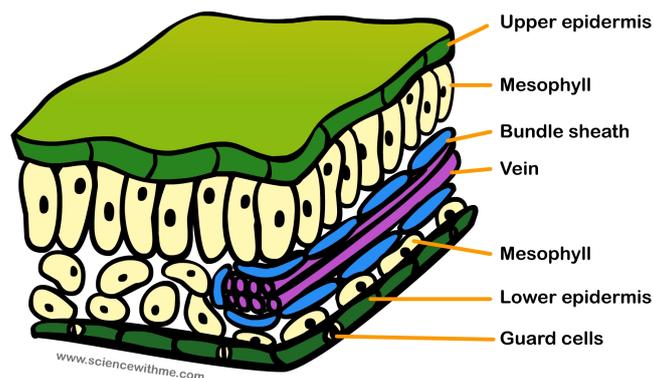
A leaf is made up of three layers.

Epidermis – This is the outer layer of cells covering the leaf. It is usually transparent and is waxy to prevent water loss.

Mesophyll – This is the interior of the leaf between upper and lower epidermis. This is where most of the photosynthesis occurs. The Mesophyll is divided into two layers a) The upper palisade layer which is tightly packed. Beneath the palisade layer is the b) spongy layer which is, you've guessed it...spongy!

Veins - The blackish lines in the leaf blade are called veins. The largest black line is the leaf's single "midvein," running from the petiole to the leaf tip, the smaller blackish lines branching off the midvein are "secondary veins". Veins lend support to the leaf tissue, helping it keep its shape, just like the ribs in an umbrella. Veins also move substances within the leaf, rather like the veins in our own bodies move blood.

CROSS SECTION OF A LEAF



Why do leaves change color?

Chlorophyll is the chemical in leaves that make them green in color. In spring and summer, when there is lots of sunlight, this chemical absorbs energy from the sun and turns it into carbon dioxide and water into sugar and starch.

However, during the fall and winter when there isn't much sunlight the leaves stop making food and the chlorophyll breaks down making the green color disappear. The other colors of the leaves begin to show such as red, orange, yellow and gold. As the leaf is changing colors, the stem is also changing.

Where it is attached at the tree (leaf axil) the cells supporting the leaf are cut. When the wind blows or if the stem is dry, the leaf falls to the ground. That's why the trees become bare in autumn! Trees that lose their leaves after changing color are called deciduous trees for example oak, maple, birch and elm.

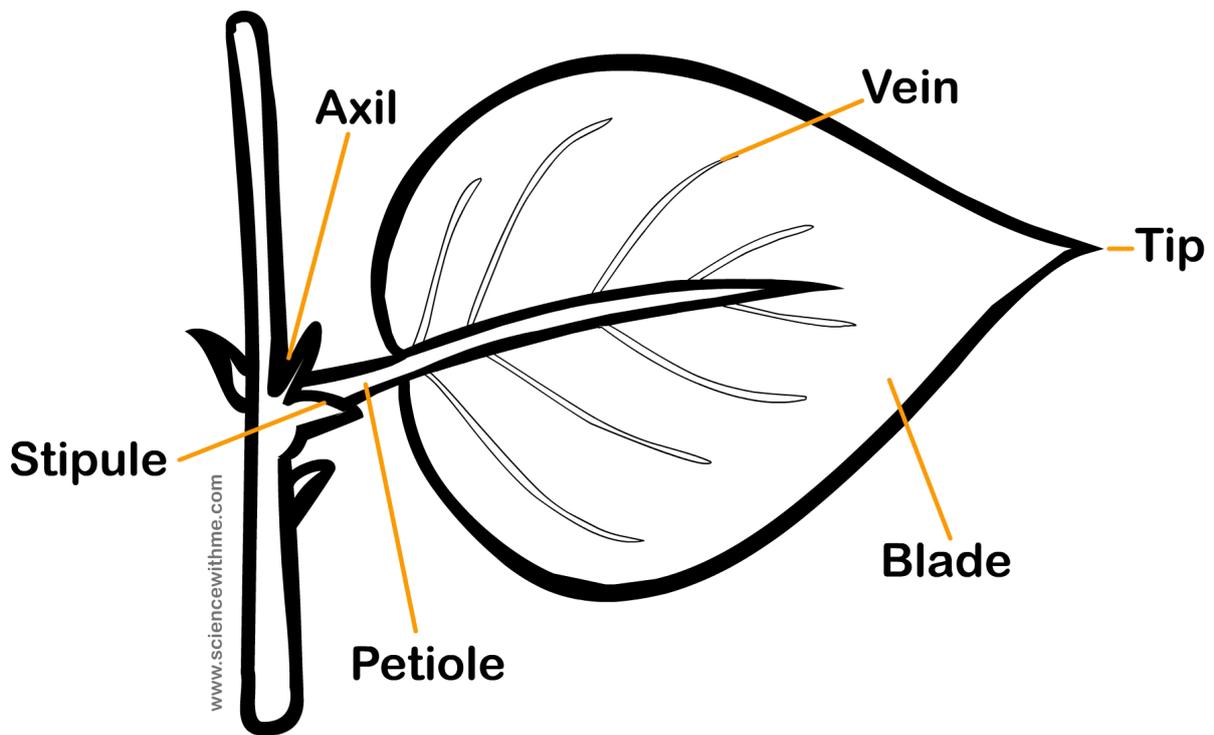
Interesting Facts

- Leaves alone account for 75% of our solid waste in the fall
- The oils in some leaves are said to have healing properties. Used in aromatherapy to alleviate headaches and repel insects.

Name : _____

Color the Leaf

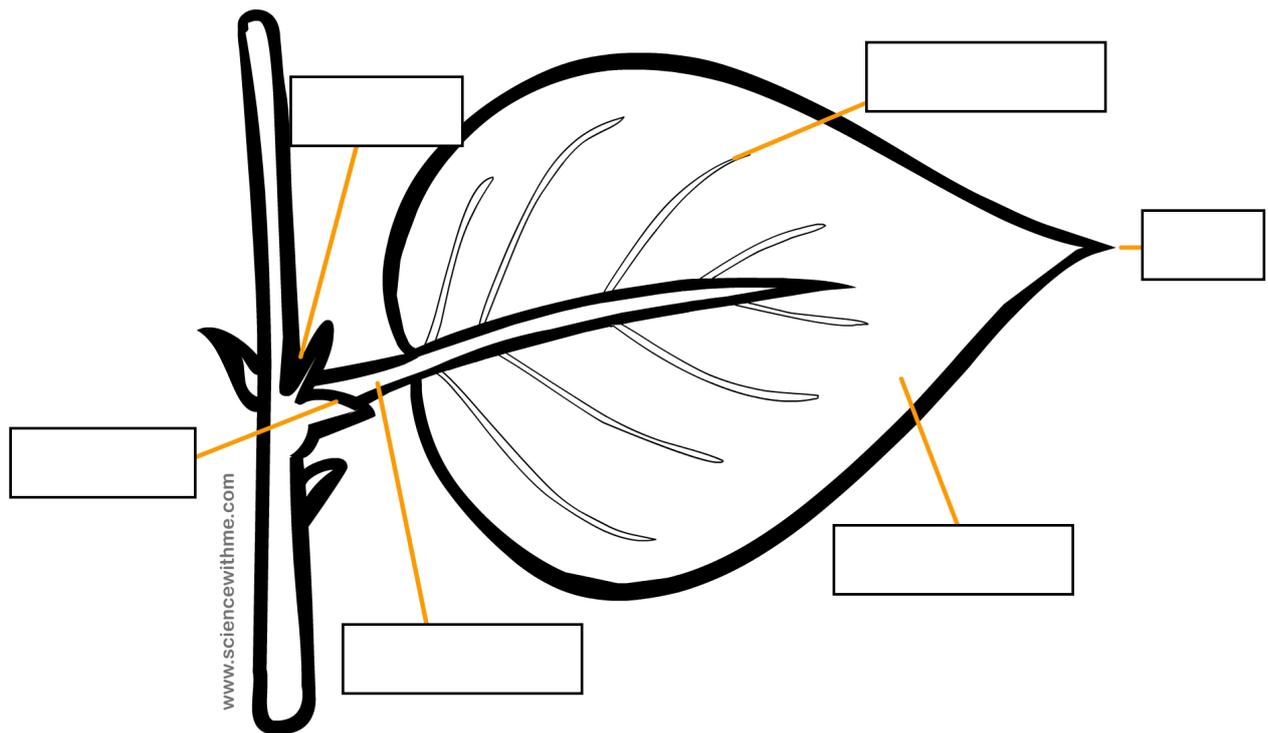
LEAF PART NAMES



Name : _____

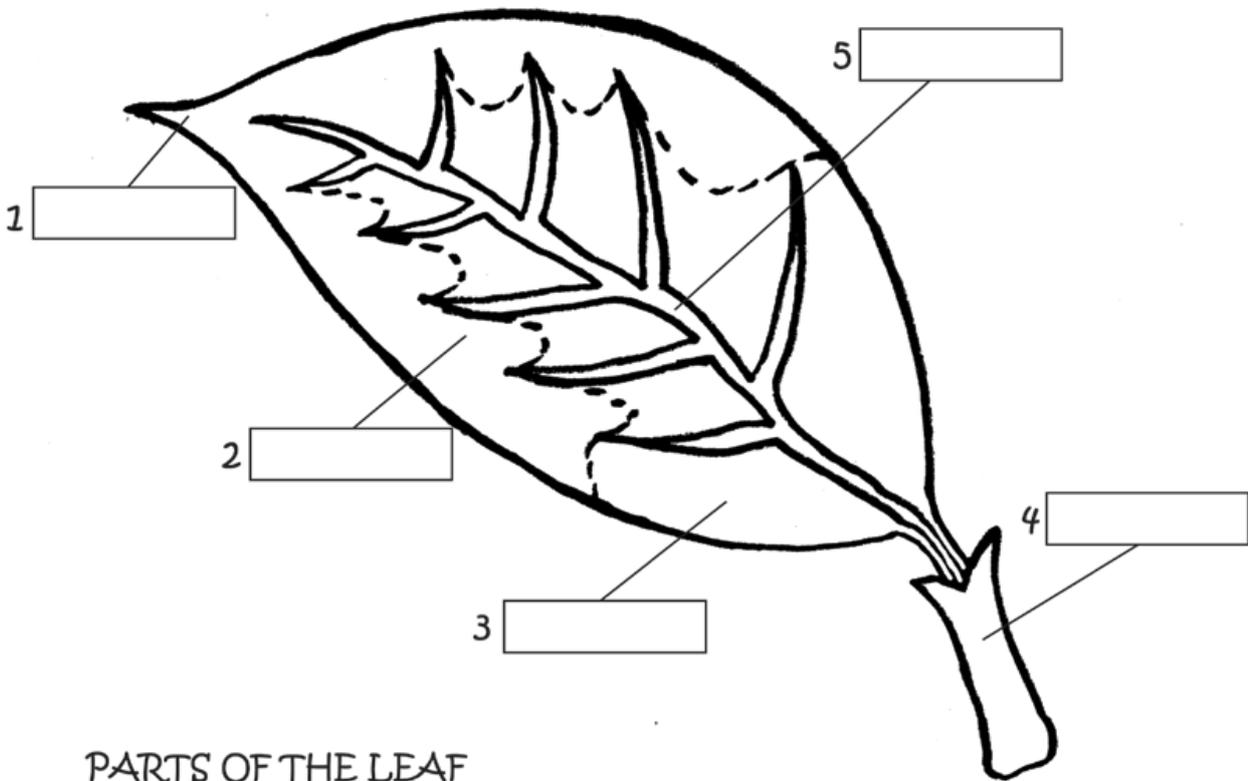
Color and Label the Leaf

LEAF PART NAMES



Name : _____

COLOR AND LABEL THE LEAF



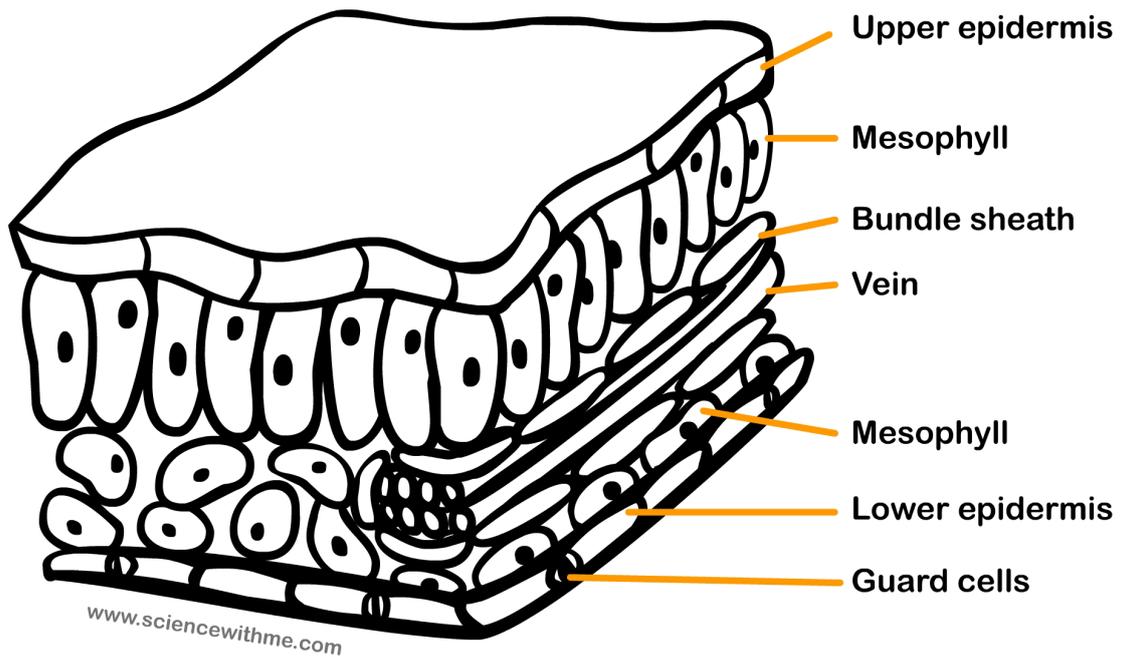
PARTS OF THE LEAF

1. Apex
2. Blade
3. Petiole
4. Stipule
5. Veins

Name : _____

Color the Cross Section of the Leaf

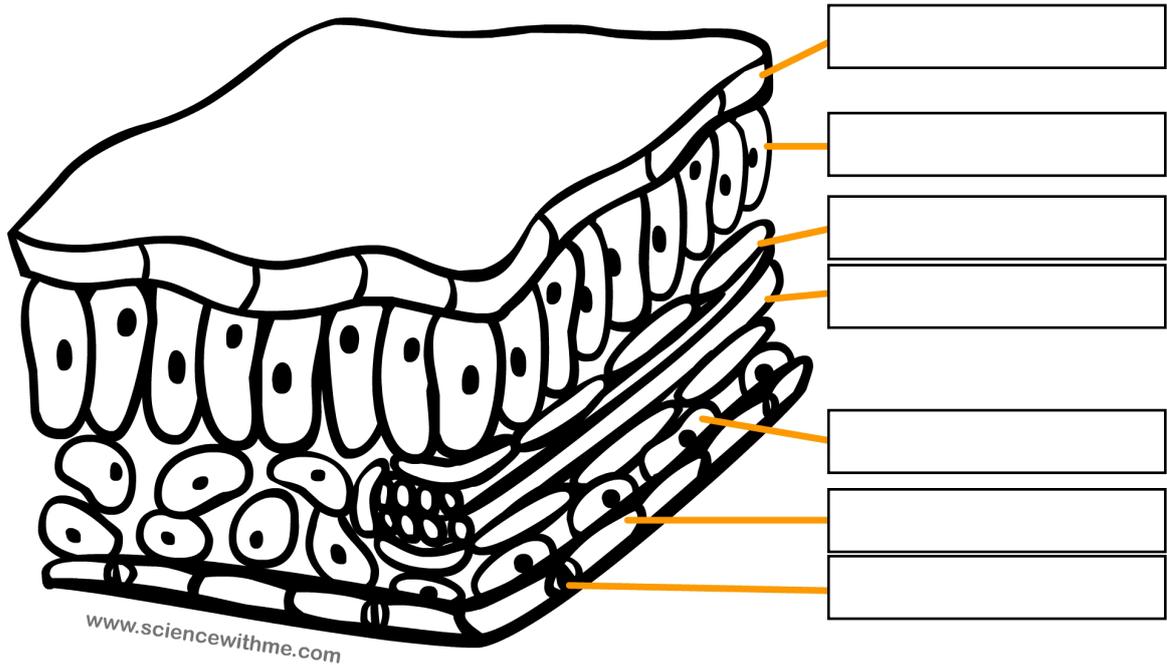
CROSS SECTION OF A LEAF



Name : _____

Color and Label the Cross Section of the Leaf

CROSS SECTION OF A LEAF



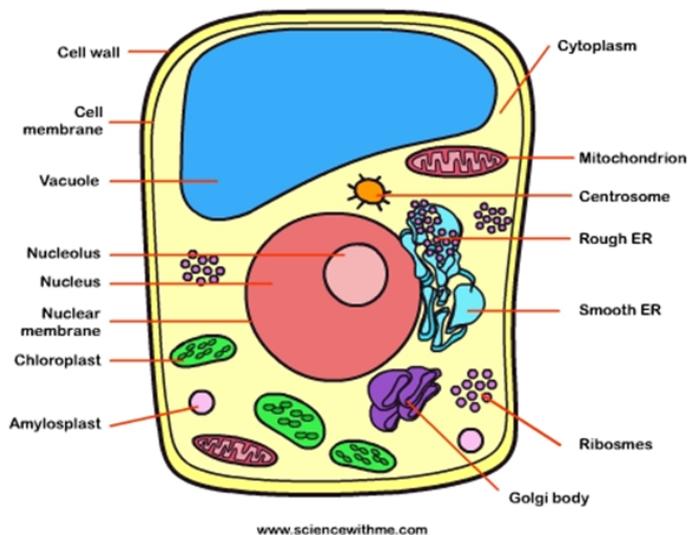
LEARN ABOUT THE PLANT CELL

All around you, there are cells. A cell is the smallest biologic unit that is able to live on its own or which has the potential to live. So how big is a cell? There are some cells that you can see without a microscope such as the egg yolks of birds. However, most cells cannot be seen with unaided human eyes. If you want to see actual cells, you need a microscope. All living things are made up of cells. While some organisms are unicellular which means one organism has one cell (e.g. bacteria), plants and animals are multicellular which means they have many cells. Plant cells are special in that they can manufacture the plant's own food, unlike your own cells which have to be supplied with nutrients by eating.

What are the basic parts of a cell?

Although cells have different sizes, shapes and activities, all of them have three basic structures: the nucleus, the plasma membrane and the cytoplasm. These components make life possible for the cell.

- **Nucleus.** The nucleus contains the genetic material of the organism. This genetic material is deoxyribonucleic acid (DNA) for plants. Different plants have unique DNA compositions, which sometimes help scientists identify new species or classify existing ones. Plant cells are called "eukaryotic" because they have a nucleus. Organisms like bacteria, which lack a nucleus but have nucleic acid floating in their cytoplasm are called "prokaryotic".



- **Plasma membrane.** This is the thin, outermost membrane that maintains the cell as a unit distinct from neighboring structures. It serves as a mold and a limit for the inner contents of the cell. This part of the cell serves two purposes. First, it allows the cell to undergo several metabolic processes independent of its surroundings. Second, it allows the cell to communicate with neighboring cells by allowing substances and chemical and electrical signals to travel through.

- **Cytoplasm.** This part of the cell is everything that is between the nucleus and the plasma membrane. It is semifluid and it is a place, which contains other structures called "organelles". The cytoplasm is important for maintaining the integrity and stability of the cell and the organelles it contains have functions essential to the cell's life.

What is the cell wall?

The cell wall characterizes all plant cells. It consists of cellulose. Cellulose is a polymer of glucose and is thus called a polysaccharide. The presence of cellulose in the cell walls of plants is the reason why eating fruits and vegetables are important. Humans lack the enzyme called "cellulase" which can break down cellulose. Without this enzyme, you cannot break down the cell walls of plants, which make up the plant fiber. This fiber then acts like a broom to clean your intestines and helps you maintain normal bowel habits.

What organelles are found in both plants and animals?

An organelle is a membrane-bound compartment or sac located within the cell that has a specialized function. The nucleus is an organelle that is found in plants and animals. The following organelles are also found in both plants and animals.

- **Mitochondrion.** This organelle is called the powerhouse or power generator of the cell because it is where energy, in the form of adenosine triphosphate (ATP), is released from glucose. Note that glucose is present in what you eat. Glucose is then carried by the blood to your cells. When glucose reaches the cell, it is directed to the mitochondria, where energy is released. This energy is needed for the other functions of the cell such as the production of proteins.
- **Endoplasmic reticulum.** This organelle, also referred to as ER, is the place where biomolecules such as proteins and lipids are routed and modified. Rough ER has ribosomes and serves as a place where polypeptides become proteins. Smooth ER has no ribosomes and serves as a place where lipids are synthesized. Plant seeds are rich in smooth ER because they provide the plant with food when it is still unable to utilize nutrients from the soil and from its environment.
- **Golgi bodies.** The final processing of proteins and lipids occurs in the Golgi bodies. These biomolecules are then shipped to different parts of the cells.

What are organelles found only in plant cells?

- **Plastids.** These organelles are specialized organelles for photosynthesis or storage. Plants have three types of plastids: amyloplasts, chloroplasts, and chromoplasts. Amyloplasts do not have pigments like the other two types of plastids but they store starch. Plenty of amyloplasts are found in the cells of plant stems, in underground stems (e.g. potato tubers) and in seeds. Chloroplasts are the organelles that contain chlorophyll and are responsible for the ability of plants to use sunlight (photosynthesis) to generate energy. This energy is then used to manufacture glucose and starch from carbon dioxide and water. Chromoplasts do not contain chlorophyll but they contain carotenoids. Carotenoids are pigments, which give plants their red and yellow colors. They are particularly important for attracting pollinators (e.g. butterflies and bees) and other organisms which facilitate reproduction and seed dispersion.
- **Vacuoles.** Vacuoles are organelles that store different types of substances and help the cell grow. They can contain sugars, ions, or simply, water. A vacuole expands during cell growth.

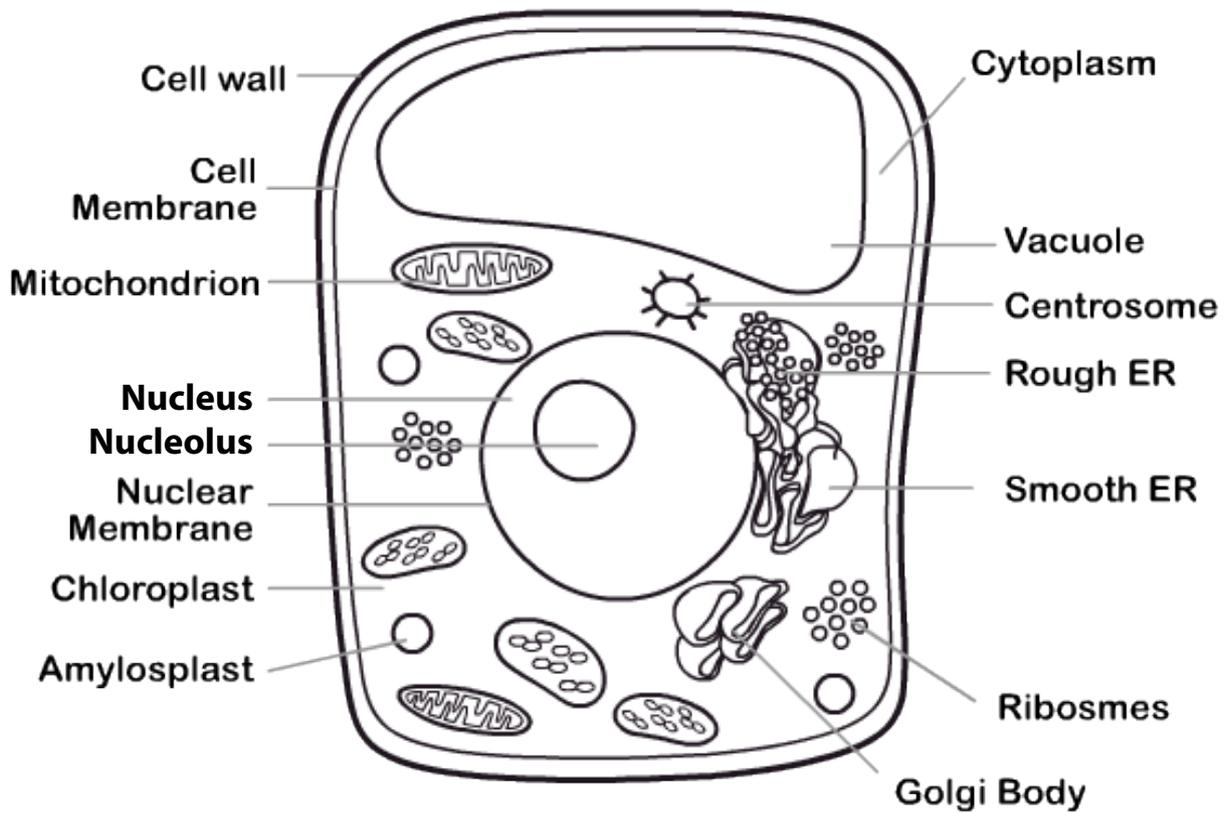
What are the other non-membranous structures in cells?

Two important structures, which are not considered organelles, are the ribosomes and the cytoskeleton. Both of these are found in plant and animal cells. Ribosomes are responsible for the production of polypeptides, which eventually become proteins. The cytoskeleton is important for maintaining the overall shape and organization of the cell and facilitates the movement of the cell's internal structures from one place to another.

Plant cells are important structures that make up all plants, regardless of species.

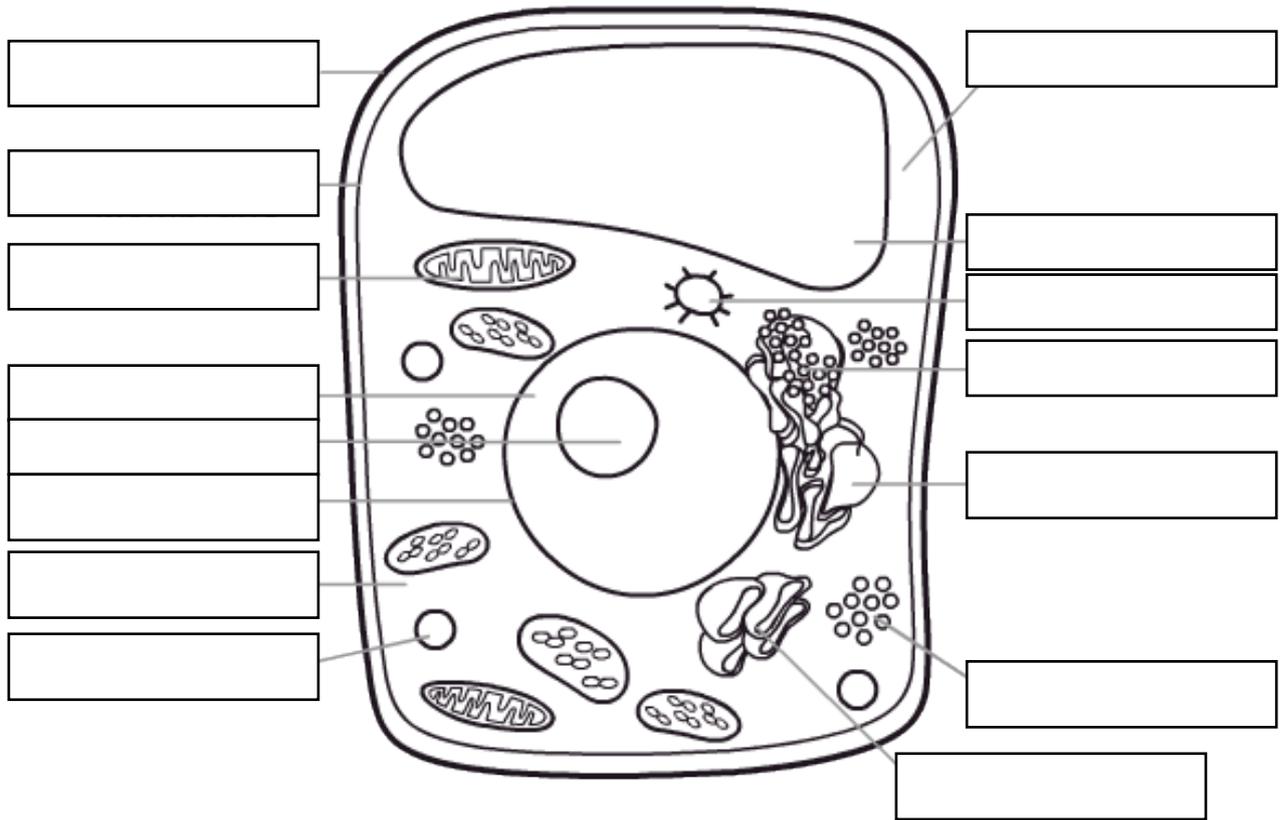
Name : _____

Color the Plant Cell



Name : _____

Color and Label the Plant Cell



LEARN ABOUT PHOTOSYNTHESIS:

How do plants eat?

Very few plants can actually trap their own food and none can go grocery shopping so plants need to make their food by themselves if they want to eat! Plants are fortunate as they are the only living organisms that can make their own food. How do they do this?

They make their food by combining carbon dioxide gas that is found in air with water and nutrients that they absorb from the soil.

In order to do this though they need energy – which they get from sunlight. The energy from sunlight (solar energy) is used by the plant to make carbon dioxide and water **react chemically together** and change into glucose (food) and oxygen. This process is called photosynthesis. The word photosynthesis comes from two Greek words: photo meaning light and synthesis meaning putting together so photosynthesis means “putting together with light”.

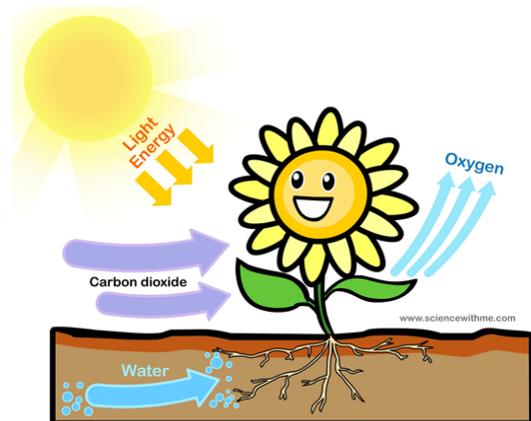
We can write photosynthesis like this:

Carbon Dioxide(gas) + Water + sunlight → Glucose + Oxygen(gas)

$6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow{\text{sunlight}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{O}_2$

In the process of photosynthesis plants change

solar energy into chemical energy.

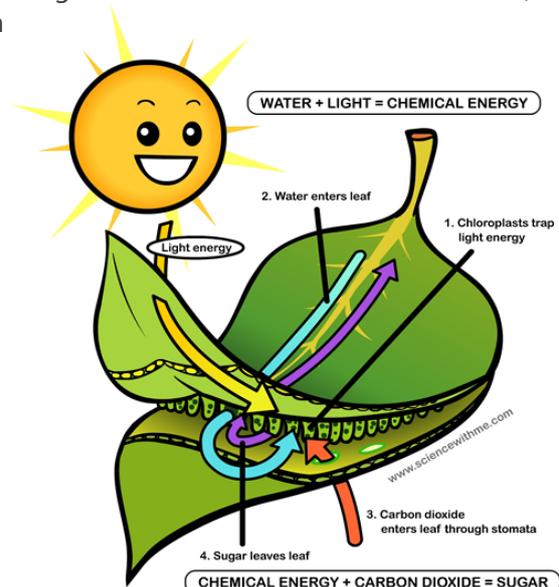


What has the sun got to do with photosynthesis?

The sun is a very powerful source of energy. People are always trying to harness it to make electricity, warm their houses, heat their water etc. Plants figured out how to use solar energy millions of years ago to make their food. They use the light energy from the sun (solar energy) and convert it into chemical energy that is stored as sugar (glucose) in the plant. Excess glucose is stored as starch in the leaves, roots, stems and seeds of the plant. The energy from the sun is transferred to the plants. This energy is then passed to animals when they eat plants. Whenever the plant needs energy it breaks down its stored glucose for its life processes

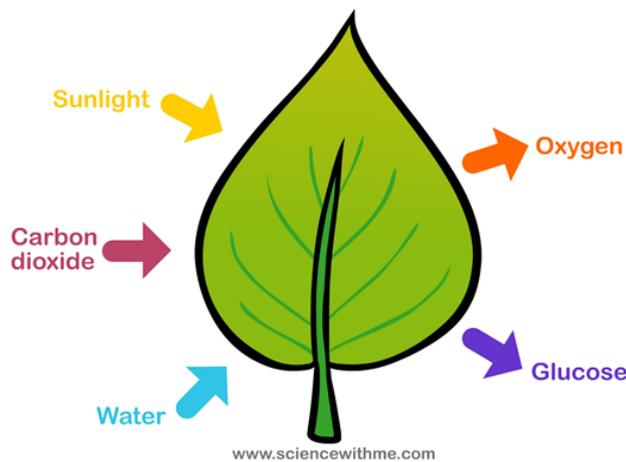
How do plants capture the sun's energy?

Plants can do this because of leaf structures called chloroplasts that contain a special substance called chlorophyll. Chlorophyll is the pigment in plants that gives leaves their green color. This pigment that is found in the leaves and the stem of the plant is responsible for absorbing light energy from the sun. At night when there is no light a plant stops making food.



Why are most leaves broad and flat?

It shouldn't be too surprising for you to learn that the plant's structure is very well adapted to trap sunlight and absorb carbon dioxide. A wide broad surface will capture far more light than a thin narrow leave surface. Solar panels that you see on houses are also broad and flat for the same reason.



What else is important to help plants grow?

Just like humans do, plants also need mineral nutrients to keep healthy, grow and perform their life processes well. Plants get mineral nutrients from the soil using their roots. The mineral nutrients are dissolved in the water the plant absorbs. If the soil does not have enough mineral nutrients the plant will not grow properly. Farmers often test the soil to check that there are enough nutrients for their crops to grow. If there are not enough minerals present in the soil the farmer will add fertilizers. A fertilizer usually contains the main minerals that a plant needs.

Why is photosynthesis so important?

Photosynthesis is one of the most important chemical reactions in the world. What are the reasons for this?

Photosynthesis makes food for plants and for animals.

We have already learned that plants feed themselves by using sunlight to convert carbon dioxide and water into food (sugar). Whenever the plant needs energy for itself it breaks down its stored food. Animals get their food by eating the plants so they depend on plants for their food.

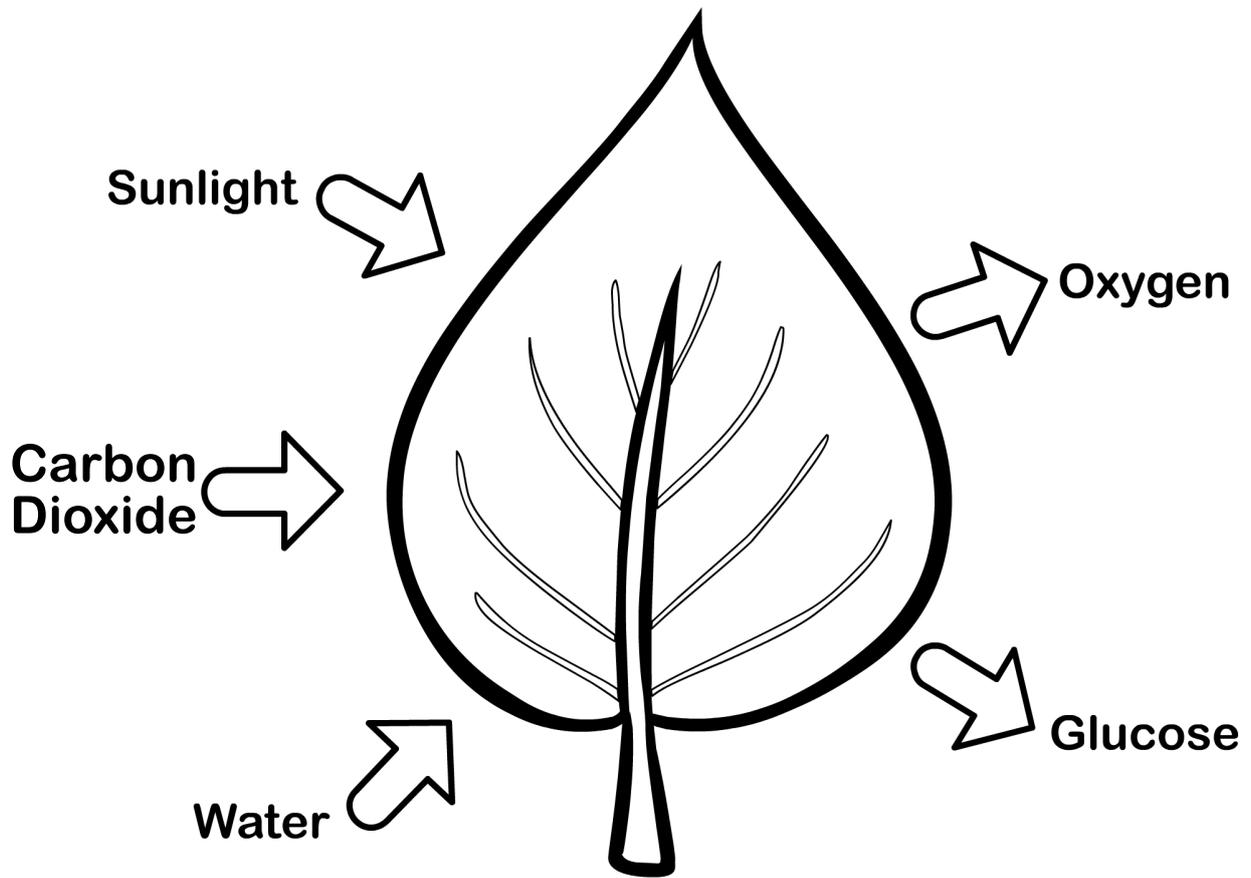
Photosynthesis results in oxygen gas being made that is released by the plant into the atmosphere for living things to breathe.

Living things breathe in oxygen and breathe out carbon dioxide all the time. Fortunately plants do the opposite. When plants are making food they breathe in carbon dioxide and breathe out oxygen. Therefore plants are extremely important to humans and animals as they give them oxygen to breathe and prevent us all from suffocating. Oxygen is needed by all living organisms to burn up food for energy.

Photosynthesis results in carbon dioxide gas being removed from the atmosphere. Carbon dioxide is a greenhouse gas that is responsible for global warming.

Name : _____

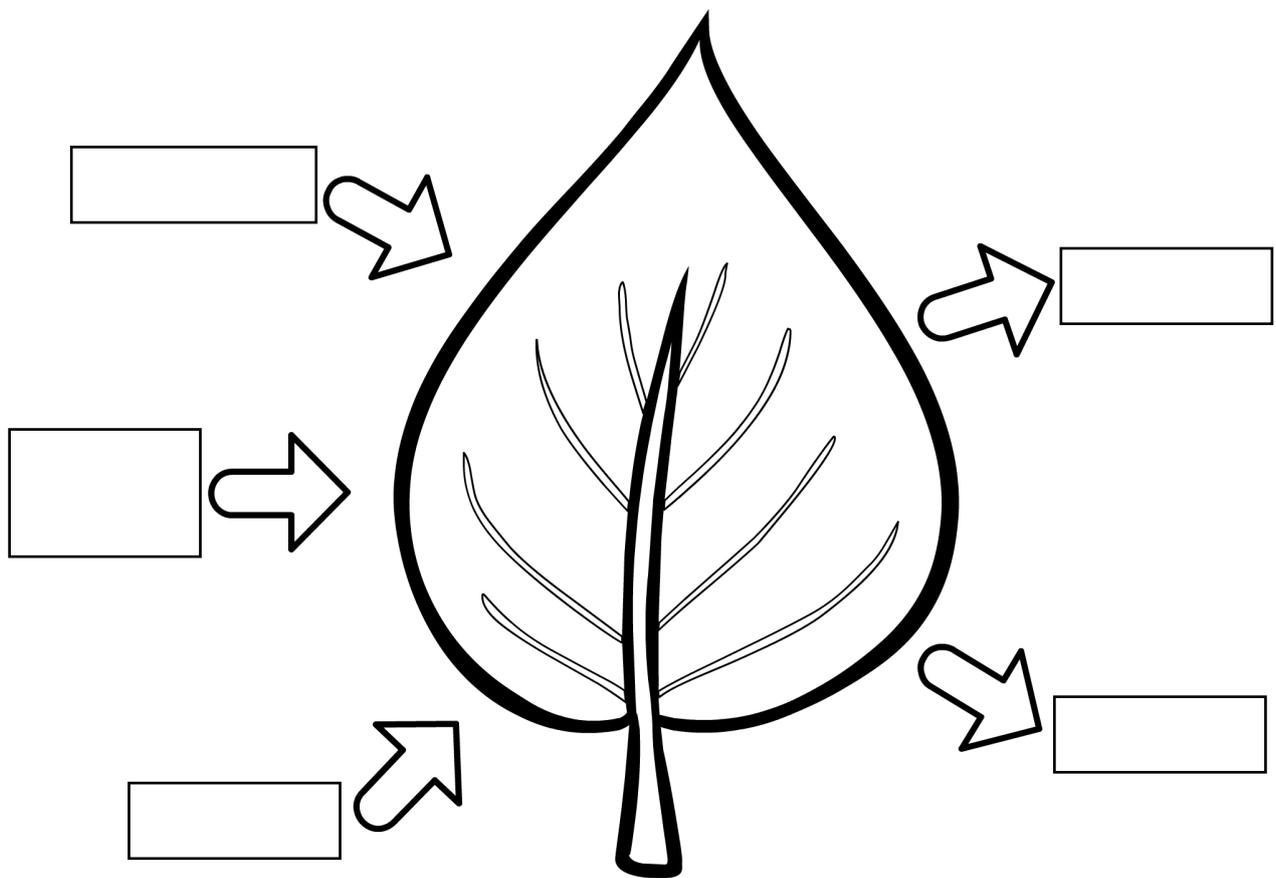
Color the Leaf



www.sciencewithme.com

Name : _____

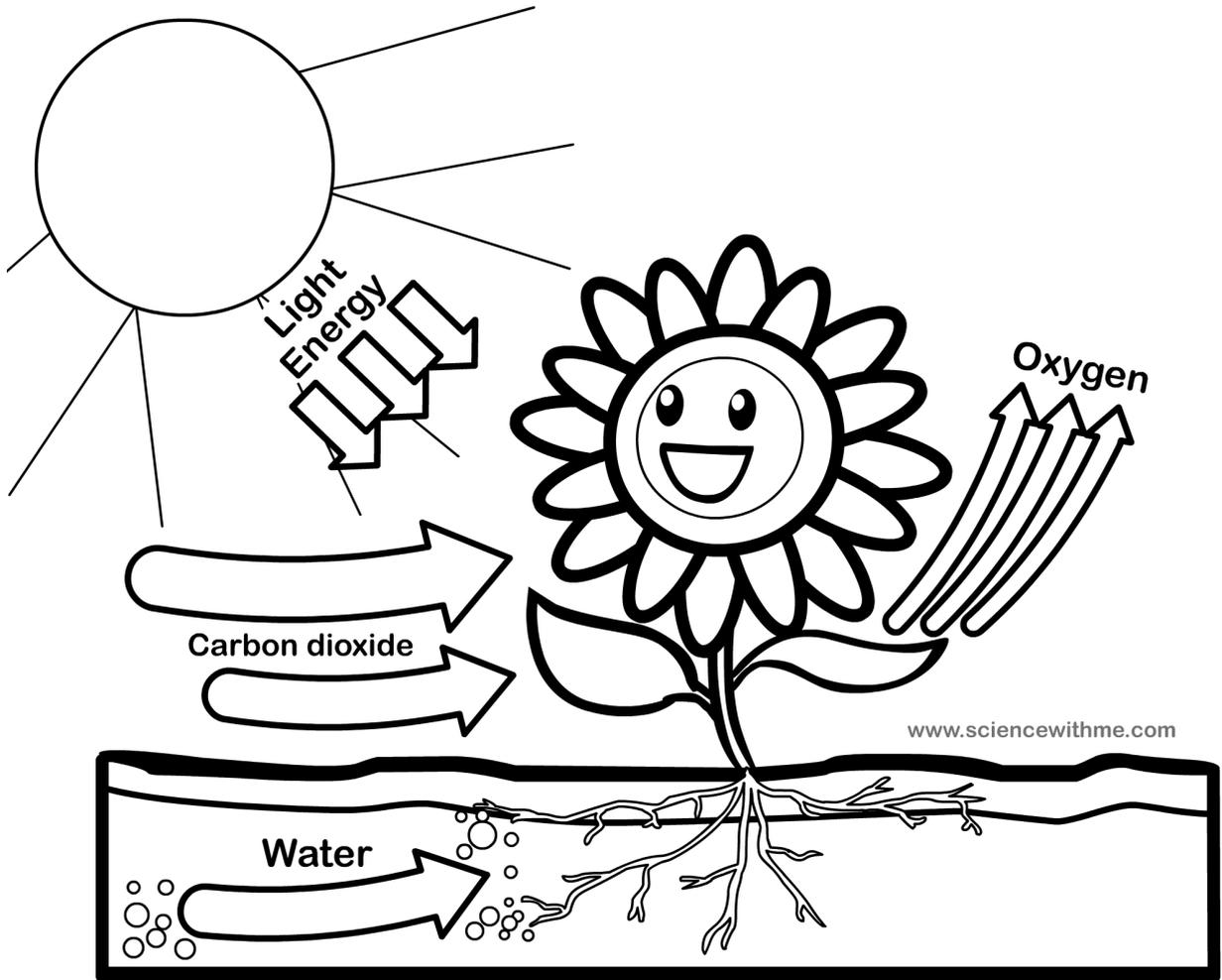
Color and Label the Leaf



www.sciencewithme.com

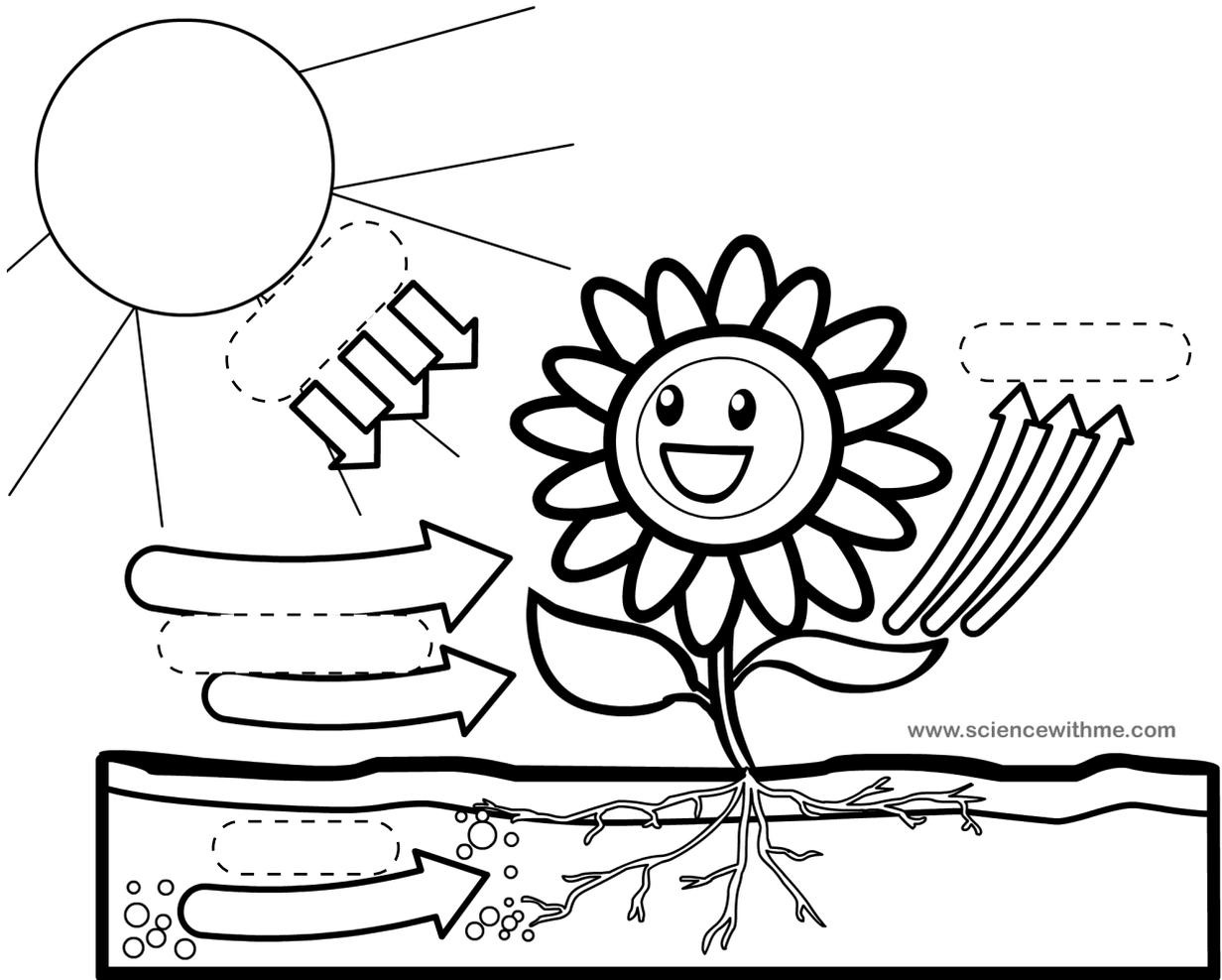
Name : _____

Color the Photosynthesis Process



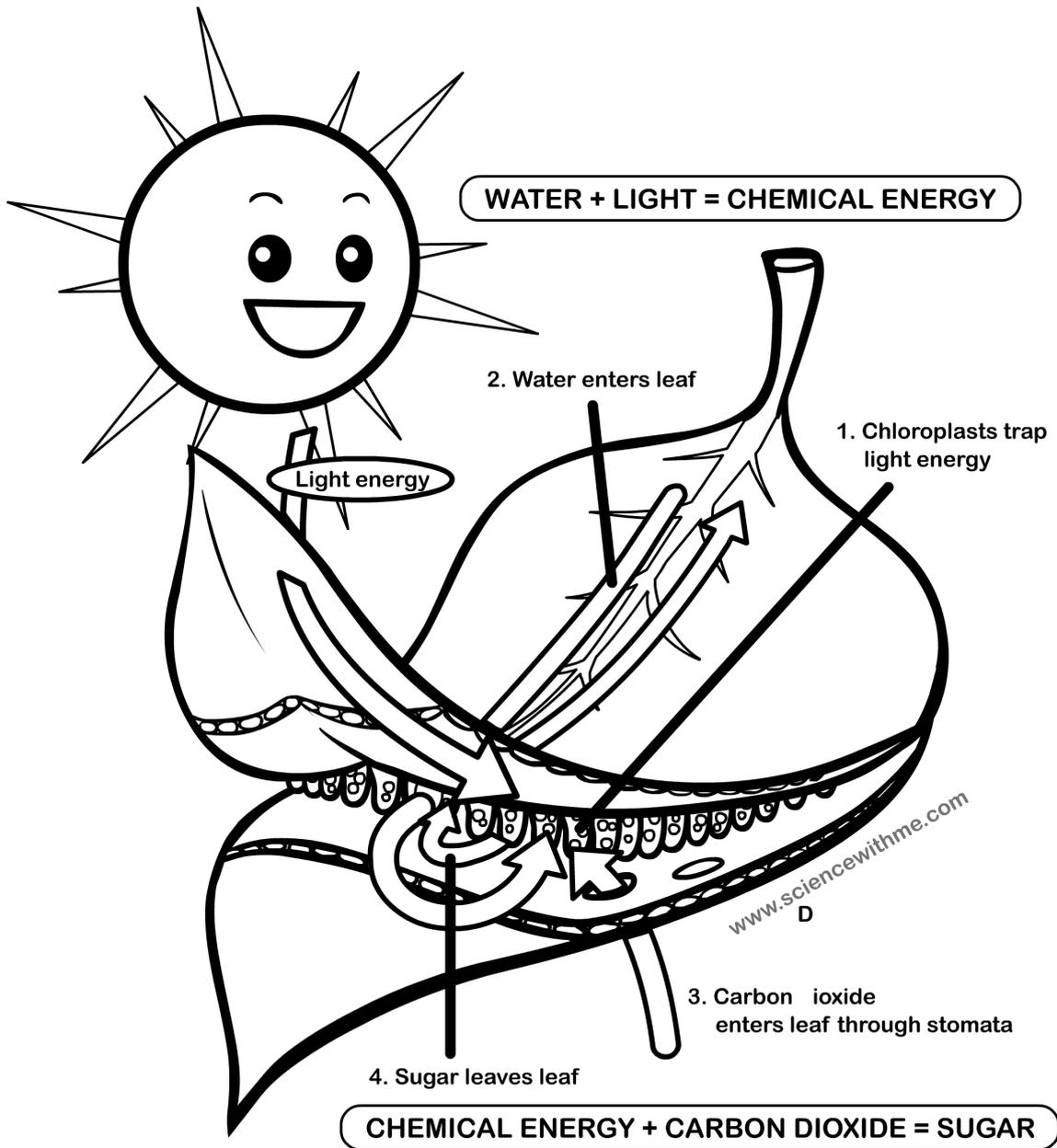
Name : _____

Color and Label the Photosynthesis Process



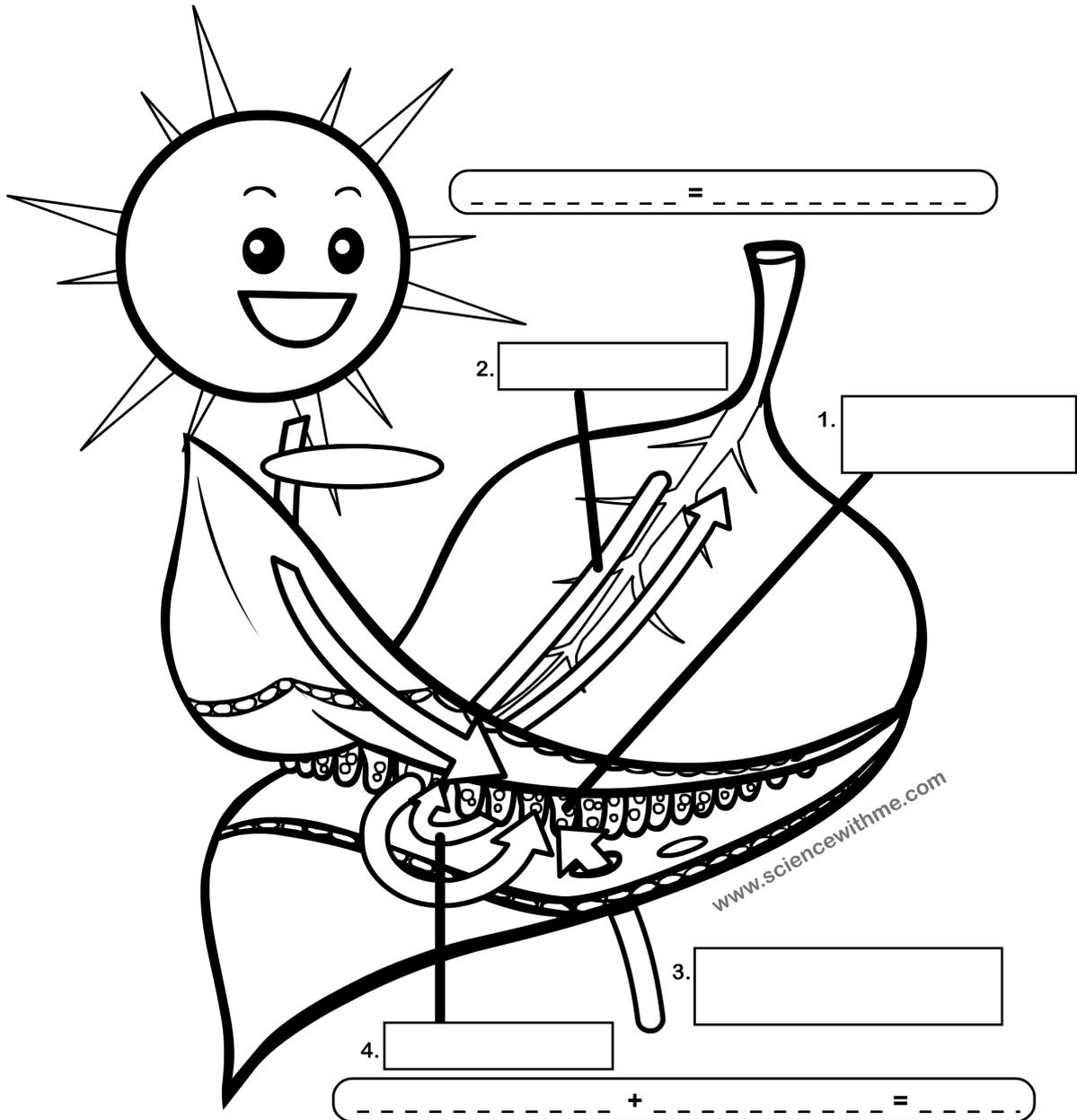
Name : _____

Color the Photosynthesis Process



Name : _____

Color and Label the Photosynthesis Process



LEARN ABOUT TRANSPORT IN PLANTS

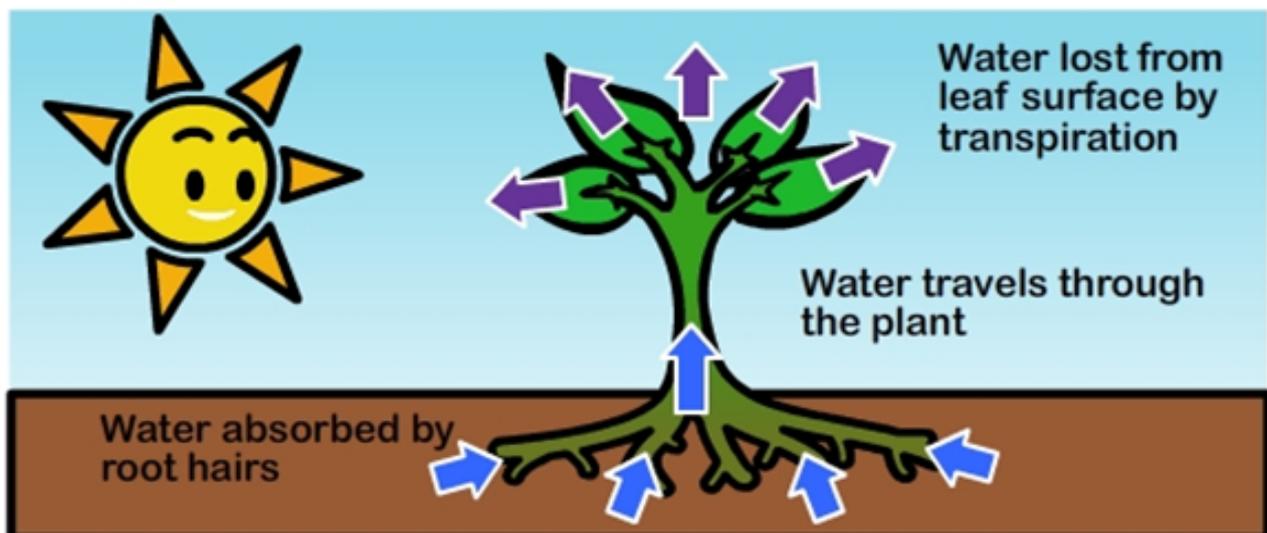
Like you and all other living organisms in the world, plants need water and nutrients from the environment in order to survive. Different parts of the plant are involved in transport or movement of water and nutrients. These parts are the roots, the stem and the leaves. The transport system of plants works similar to your circulatory system. However, plants do not have a pumping organ like the heart. Therefore, they have to make use of simpler mechanisms in order to allow the transfer of a substance from one place to another.

What are the three levels of transport in plants?

Transport in plants occurs at three levels. The first level is cellular transport, whereby solutes and ions are transferred from one cell to another. This typically occurs through diffusion and osmosis. With osmosis, water flows from an area of high solute concentration to an area of low solute concentration.

The second level is the absorption of water and nutrients from the soil by the roots. In general, as surface area increases, absorption also increases. Because of many root hairs or extensions, a plant's roots actually have a high surface area. Just think about this: if drought or water scarcity sets in, a plant which has lots of roots would have a greater chance of survival compared to a plant with a few roots. This is explained by the fact that a plant with many root extensions has greater absorptive capacity. It is the reason why during the summer, grasses in your backyard wilt easier than big trees.

The third level of transport is the transfer of water and nutrients from the root to the highest part of the plant even without a mechanical pump. Among tall trees, water and nutrients, also called xylem sap, become transported along a length of about 100 meters. This is made possible through a process called transpiration.



www.sciencewithme.com

What is xylem?

The xylem is a tube and transport system, that helps water and dissolved substances go to different plant parts. The dissolved substances are minerals from the soil and food previously stored in the stem and roots. The tubes are connected end to end. Xylem transport is said to be unidirectional, which means transport occurs in a single direction.

If you cut the lower end of a plant stem and place it in a water-and-dye solution for a few minutes or hours, the stem would absorb the solution and somehow retain the dye. If you examine the stem under a microscope, you would see that the dye is located in the xylem cells. Xylem cells are called vessel elements, tracheids and parenchymal cells. Every year, a tree gains new xylem because the old xylem dies. When you see the cut trunk of a tree, old xylem tubes appear like concentric rings.

What is phloem?

The phloem is another transport system in plants that carries food or sucrose, a type of sugar, from the leaves to other plant parts. Sucrose is actually an end-product of photosynthesis. Up to 30% of phloem sap is made up of sucrose. Phloem transport is bidirectional, which means that transport occurs in two directions. In flower-bearing plants or "angiosperms", the special cells in phloem are called sieve-tube members. Phloem is always alive, which is why it does not form rings like those of xylem.

What is translocation?

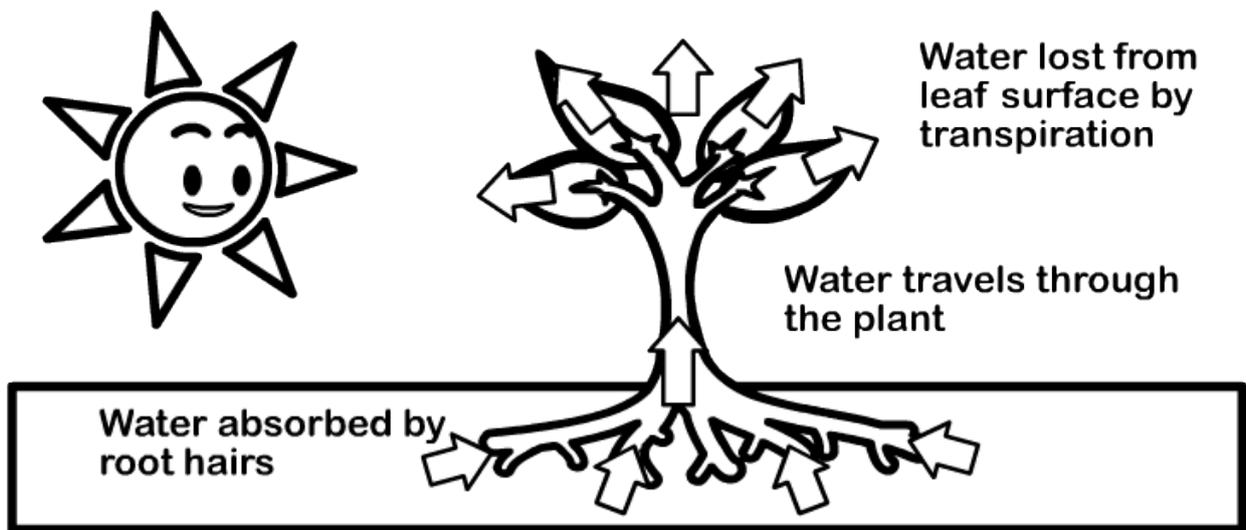
Basically, phloem sap moves from a sugar source (leaves) to a sugar sink (like roots). The phloem loading and unloading process is called "translocation". During translocation, when phloem is loaded with sucrose, water flows into phloem through osmosis. When the phloem sap reaches the sugar sink, unloading occurs, which means that as sugar goes out, water also flows out. Water is then recycled through xylem transport.

What is transpiration?

Transpiration is the process of water loss from the stomata (plural for stoma or leaf opening) in plant leaves. However, it also occurs in flowers, stems and roots. It is similar to evaporation. Transpiration or water loss allows carbon dioxide to get into the leaves from the air. Remember that carbon dioxide is needed for photosynthesis. Aside from allowing the plant to get carbon dioxide from the air, transpiration also enables xylem transport. Note that water flows from an area of higher water (hydrostatic) pressure to an area of lower pressure. Because of transpiration, the upper parts of the plants have a lower amount of water and a lower hydrostatic pressure. Therefore, water is able to flow from the roots to the upper parts of the plant, through the xylem tubes. However, there are times that transpiration is not necessary or not possible. For instance, during the night, transpiration stops. Additionally, the plant detects when too much water is lost. To prevent further water loss, the stomata close, effectively shutting down transpiration.

Name : _____

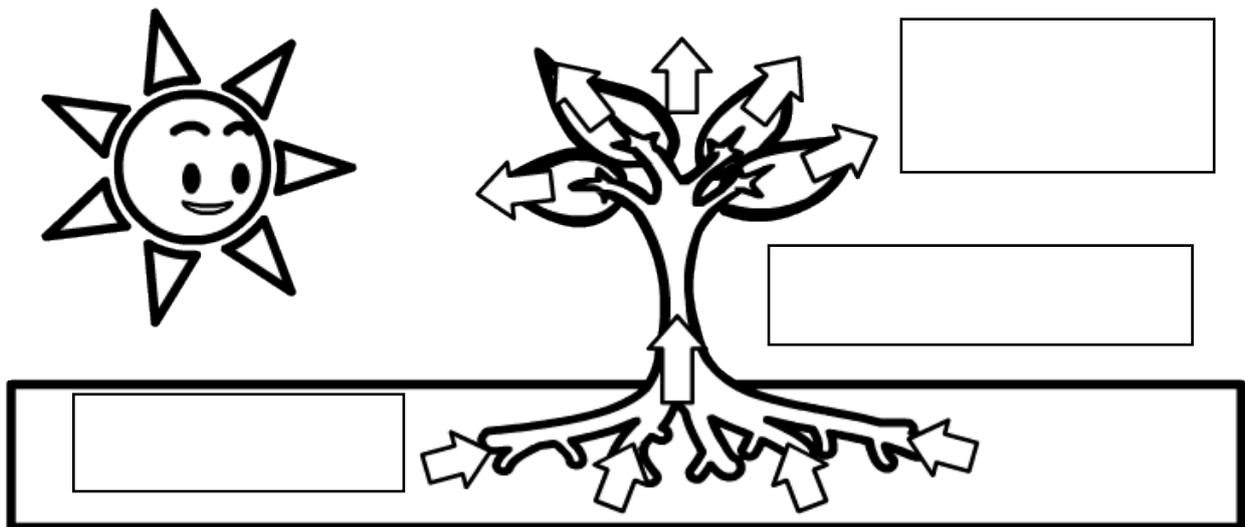
Color Transpiration in the Plant



www.sciencewithme.com

Name : _____

Color and Label Transpiration in the Plant



www.sciencewithme.com

LEARN ABOUT SEEDS

What is a seed?

A seed is a plant structure that contains a plant embryo (baby) and is stored in a covering called the seed coat. This embryo is an immature plant (a fertilized ovum) from which a new plant will grow under proper conditions. Within the seed there is usually a store of nutrients to help this embryo (seedling) grow. The seed coat (testa) protects the embryo from injury or from drying out.

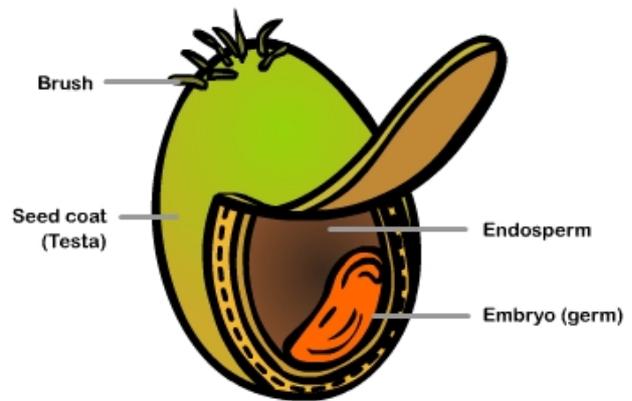
Seeds come in many shapes and sizes and can be found anywhere outdoors. Seeds can be found all over your back yard or at the park.

What are the parts of a seed?

The anatomy of a seed is made of three main parts.

The Embryo: a baby plant or seedling. Sometimes this is called a germ. **The Endosperm:** nutrients (food) for the embryo. Each plant has either one or two cotyledons (food storage areas). Monocots have one, dicots have two).

The Testa: which is the seed coat for protection.



www.sciencewithme.com

What is germination?

Seed germination is a process by which a seed embryo develops into a seedling. In simple words, germination is the "waking up" of a seed. Germination occurs when a seed goes from a dry, dormant state into an activated seed that will turn into a plant. To wake up the embryo inside the seed conditions must be right. Lots of water and sunlight are required to wake up a dormant seed.

As the seed soaks in water the seed coat fills up and gets so big it breaks. Even after it breaks the embryo still uses the food inside the seed to grow. As the seed continues to soak up the water the seedling bursts through the soil surface. This phase of plant growth is called seedling establishment.

Some seeds have thin seed coats and can soak up water easily and start to germinate right away. Some seeds have thick seed coats and they need an animal to gnaw on it to break open the seed coat so water can get in e.g.: an acorn.
How do seeds disperse?

Seeds need to move around so that they can get planted in soil or other favorable conditions so they can germinate and grow. Unlike animals, plants are limited in their ability to move around. A seed must somehow "arrive" at a location and be there at a time that is good for germination and growth. Seeds use four ways to get moved around:

Gravity: Heavy and dense seeds fall very close to their parent e.g.: an acorn

Starting reactions that last a lifetime®

Wind: The wind helps disperse seeds. Light and fluffy seeds tend to glide on the wind to far away places e.g.: cotton seeds. In fact some seeds have shapes that are designed to travel better in the wind.

- **Gliders:** these have two wings just like an aeroplane.
- **Parachutes:** these seeds look like a little umbrella.
- **Helicopters:** These seeds are thicker and stronger on one side of the seed than the other. The heavy/light distribution causes the seed to spin when it is in the air. Helicopter seeds can have one or two “wings”
- **Spinners:** Spinners travel long and far in the air. They are flat, circular shaped seeds.
- **Cottony Seeds:** These structures are light, fluffy “balls” with seeds in the middle.
- **Tumbleweeds:** These are big weedy things that hold a bunch of seeds in the center of them. You will sometimes see these in cowboy movies. They can be really really big! Bigger than people sometimes.

Water: Some plants use water for seed dispersal. These aquatic plants tend to grow in the water. These seeds float in the river, ocean, or current for a month or two before they start to group into a plant e.g.: water lily.

Animals: Some animals such as squirrels and mice like to eat seeds (and nuts) so they gather the seeds and move them around to a storage area. These animals are helping the plants disperse their seeds. Thanks Mr. Squirrel!

Some animals will eat the seeds and the seed coat will get damaged in the animal’s stomachs. The animals will then excrete (poop) the seed and the seed will be ready to germinate. Birds commonly disperse seeds this way.

Why are seeds important in nature?

Seeds serve several functions for the plants that produce them.

Key among these functions is nourishment of the embryo (baby seed), dispersal of the embryo to a new location and dormancy during unfavorable conditions. Dormancy is important because if the seedling were to burst forth during poor growth conditions the seedling would not survive. The seed prevents this from happening and keeps the embryo safe while it “sleeps” until conditions outside improve.

Seeds fundamentally are a means of reproduction. Without reproduction there would be no life, so seeds are essential to our planet.

Do seeds vary in size?

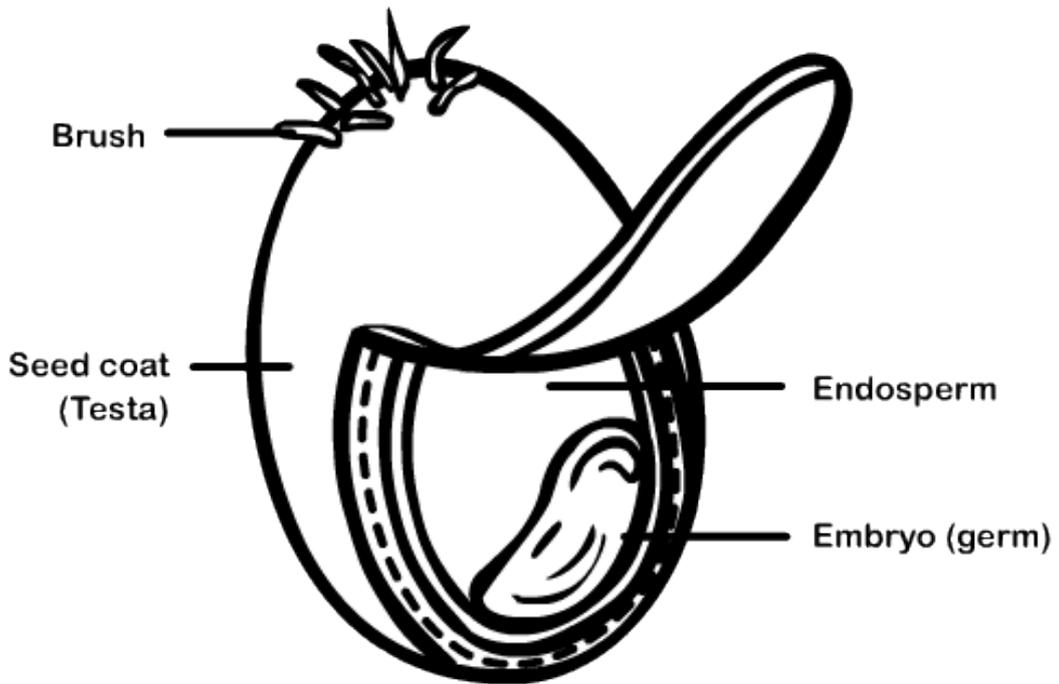
Yes! The size of seeds can vary greatly. Some plant seeds are almost invisible while as others are large enough to hurt you if they fall on your head e.g. coconuts contain very large seeds.

Interesting facts:

- The rates of germination can vary greatly. Some seeds can germinate while still hanging in the fruit on the tree while as others (e.g. Indian lotus seeds) can germinate 200 years after they are shed!
- Not all plants grow from seeds. Some plants grow from plant parts. When new plants grow from existing plant parts it is know as vegetative reproduction.

Name : _____

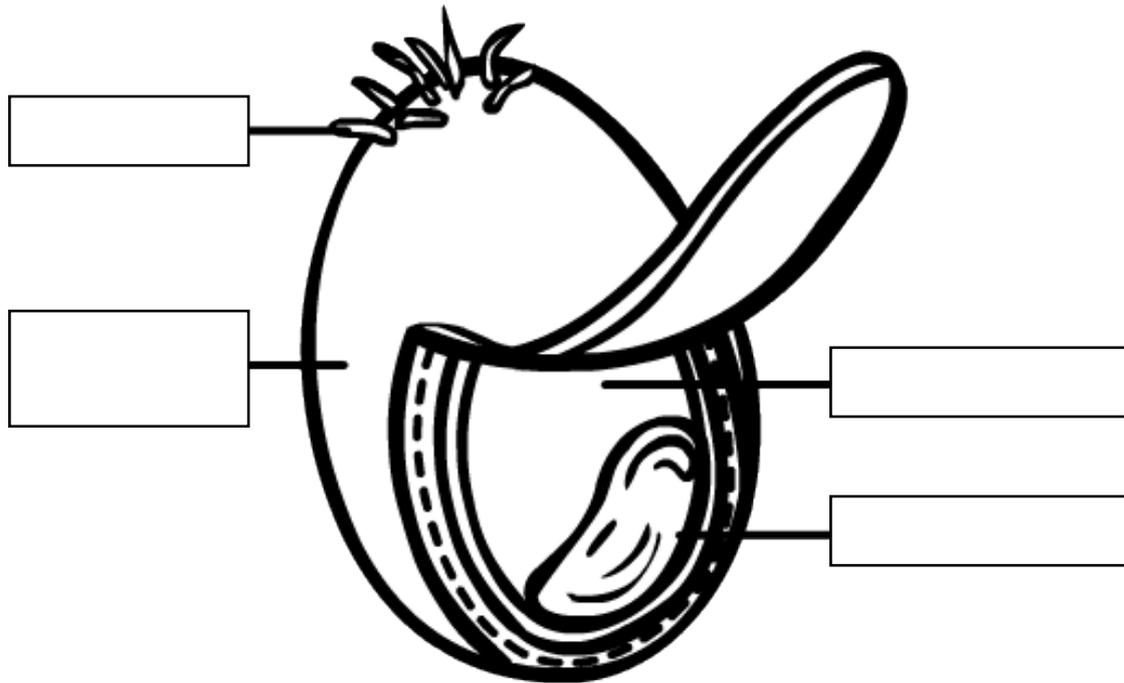
Color The Seed



www.sciencewithme.com

Name : _____

Color and Label The Seed

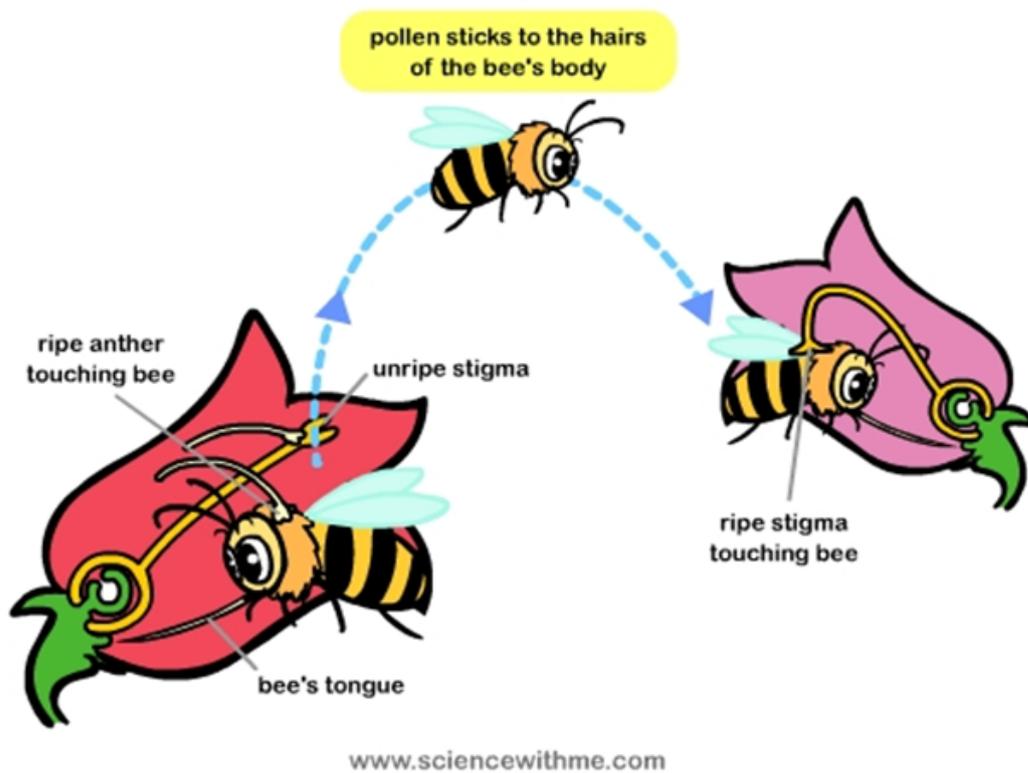


www.sciencewithme.com

LEARN ABOUT POLLINATION

What is pollination?

Pollination is an important process in the reproduction of plants that bear seeds. Without pollination, these plants would not be able to produce fruits! Yes, almost all the fruits that we eat and the beautiful flowers that we enjoy come from pollination! If you have seen yellow grains, sometimes white, black or green coloured grains in the flowers, these are pollen that help fertilize the plants' cells and turn these into seeds. Pollen acts as the main component in pollination, helping the flowers and plants create seeds that grow into fruits.



How does pollination work?

Pollination happens when pollen created from the plant's male reproductive system (called the anther or stamen) is moved to the female reproductive system (called the stigma or pistil). This fertilizes the plant's cells to produce seeds.

Have you seen how bees surround your garden? If you try to observe them carefully, bees go from one flower to another as they try to gather nectar (a sugary drink) from the flowers. Nectar which turns to honey serves as food for the bees, and as the bees pass through each flower the pollen sticks from the plants' anther onto the bees' legs, and then gets transported to the stigma. This makes up pollination.

Sometimes bees that are bred from a big colony in a huge hive also gather pollen on purpose as they collect the nectar. This makes pollination more frequent and effective in generating seeds from the plants. Most plants rely on bees and other insects or animals for pollination, although certain plants can be pollinated by wind or water.

What are the types of pollination?

There are different ways for plants to be pollinated.

- **Cross-pollination** is the more common way of pollination. This is the type of pollination that happens when bees travel from one plant to another, carrying and transferring pollen in the process. Other insects can also help pollination in plants. These insects are attracted to the pleasant scent and striking beauty of the flowers, so if you see gorgeous flowers with different pretty colours you can think that this is to attract insects that can help in pollination. The nectar from the flowers draw the insects towards it. Once a flower or plant is pollinated, seeds will start to sprout. Insects are also not the only animals that can aid in pollination. Some mammals and birds can also help transport pollen or seeds from one place to another, and help pollination. For some plants, pollination can occur through the help of wind or water. These plants either do not have attractive flowers or lack nectar, and are designed to have pollen transported by wind or water.
- **Self-pollination** is a type of pollination that does not need the help of others. Pollen grains can transfer from the stamen to the pistil by itself. These plants are fertile on their own, although you will find only a few plants that have this characteristic. Certain food plants like tomatoes belong to this category. Plants that do not need others to pollinate can produce seeds that grow into fruits faster, but to create varieties of a single type of fruit needs human intervention. Some plants that use self-pollination either have the capability to move the pollen from its stamen to its pistil, or move its pollen to the pistil of another plant.

What are pollinators?

A pollinator is a living organism or animal that helps pollination. These animals may not be aware that they are helping in pollination, but isn't it great to know that they aid in this function? Animals that help plants in pollination include insects such as bees, butterflies, moths, beetles and certain other animals such as birds and bats. Flowers that have bright colors appeal to bees, so bees mostly help pollinate flowers with yellow, orange, blue or purple colors. Butterflies are nearly the same as bees, preferring flowers with intense colors such as red, yellow and orange. Although bees are also attracted to flowers with fresh and sweet odors, butterflies tend to favor flowers that have weak scents. Hummingbirds go to long, tubular flowers that allow them to get nectar. Bats are usually drawn to flowers that open only at night.

Why are bees and other insects so important?

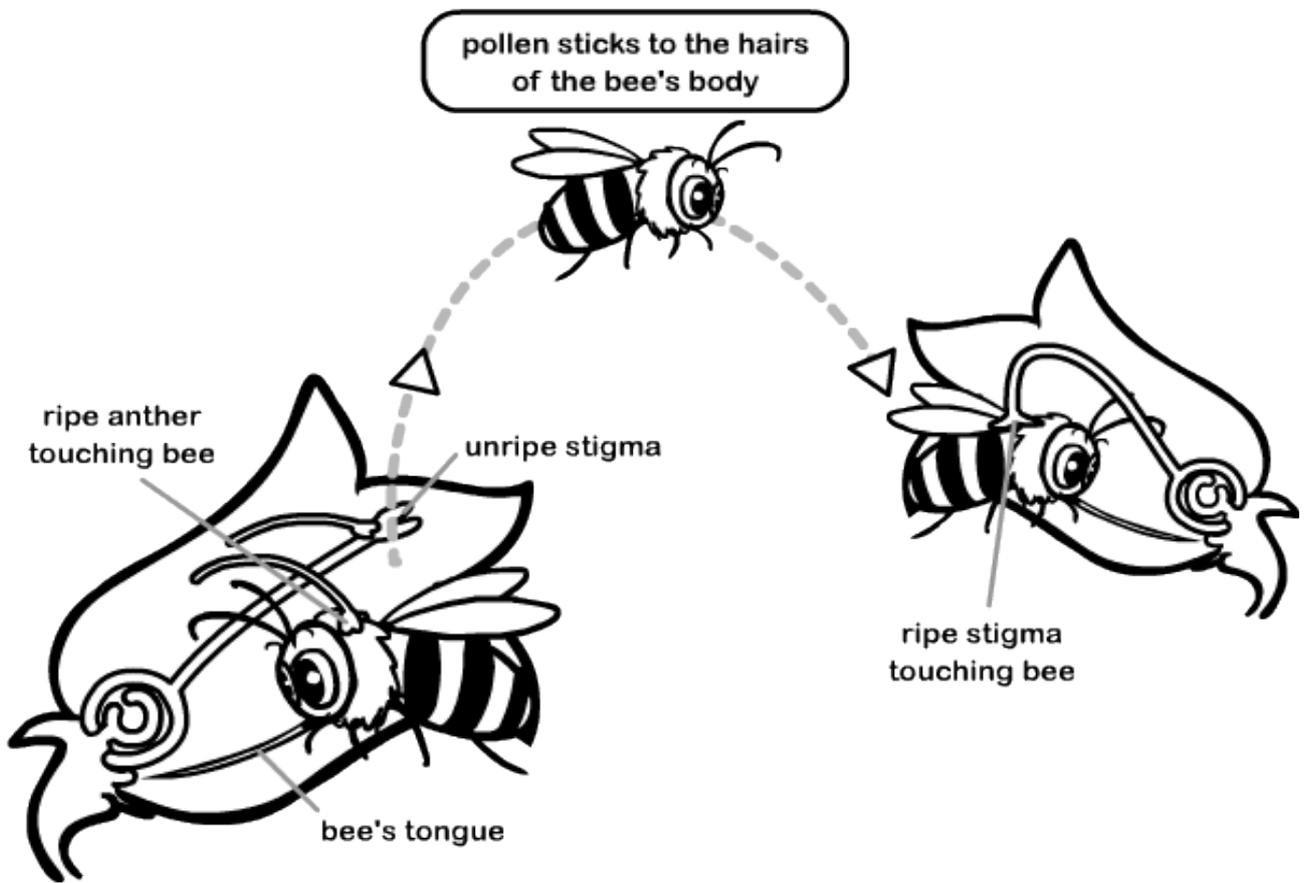
Without bees and animals that act as pollinators, pollination will not happen. Most plants are designed for insects and animals to help transfer pollen and trigger fertilization of seeds, and cannot be pollinated by virtue of wind or water, or self-pollination. Losing pollinators will damage plants and wildlife that mostly rely on these insects and animals to grow. A thriving garden exists because of these pollinators. If bees and insects die, no one will be able to pollinate plants, and we will lose our source of food and oxygen.

We need bees and other animals to help encourage pollination and help cultivate plants. Some children play with insects and kill them, not knowing that by doing this they are damaging the environment. Tell your family and friends how bees and other insects are great contributors to raising plants and make them aware of why they are important to the environment and to us.

Learning about pollination makes it easier for us to understand how science works in our environment. Plant cells are important structures that make up all plants, regardless of species.

Name : _____

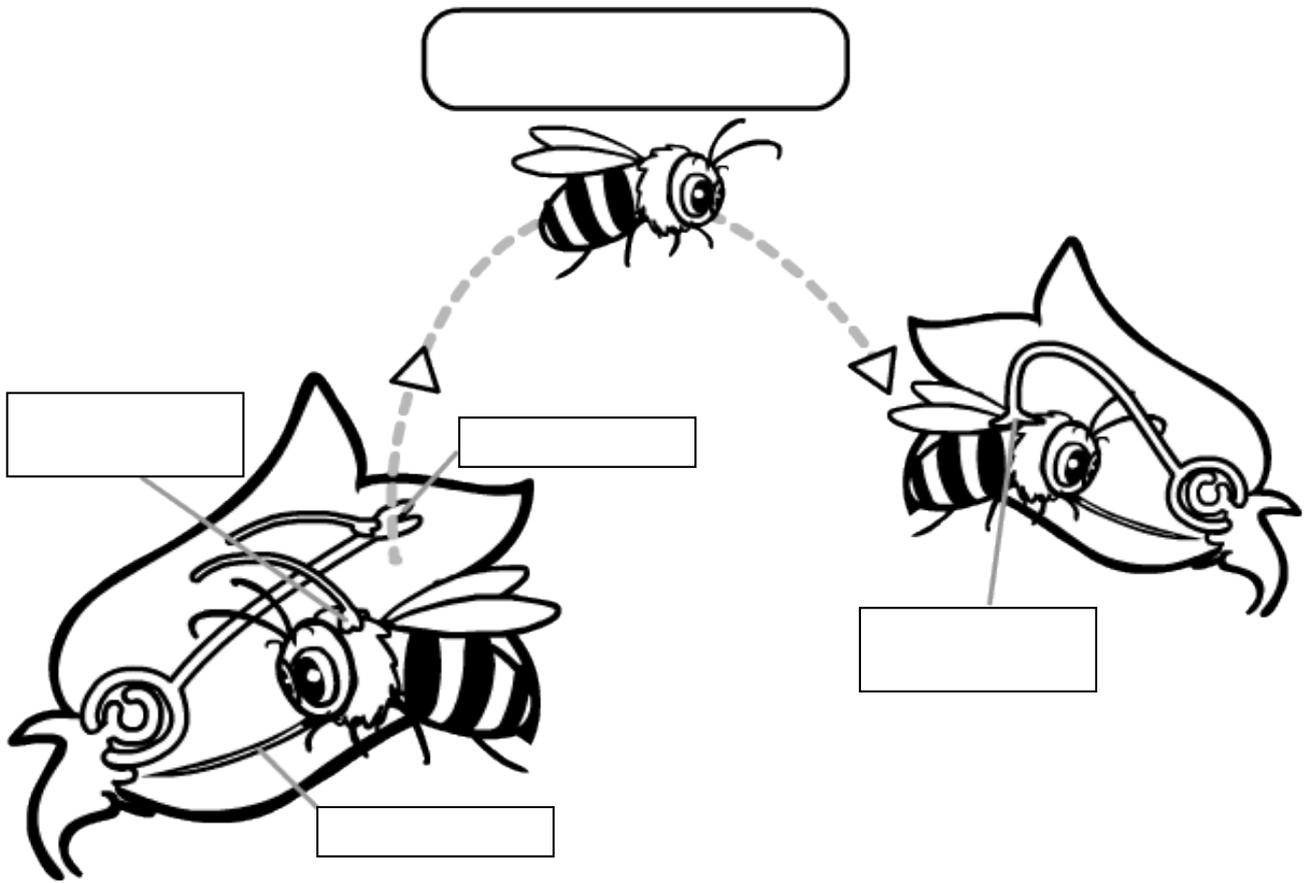
Color the Pollination Process

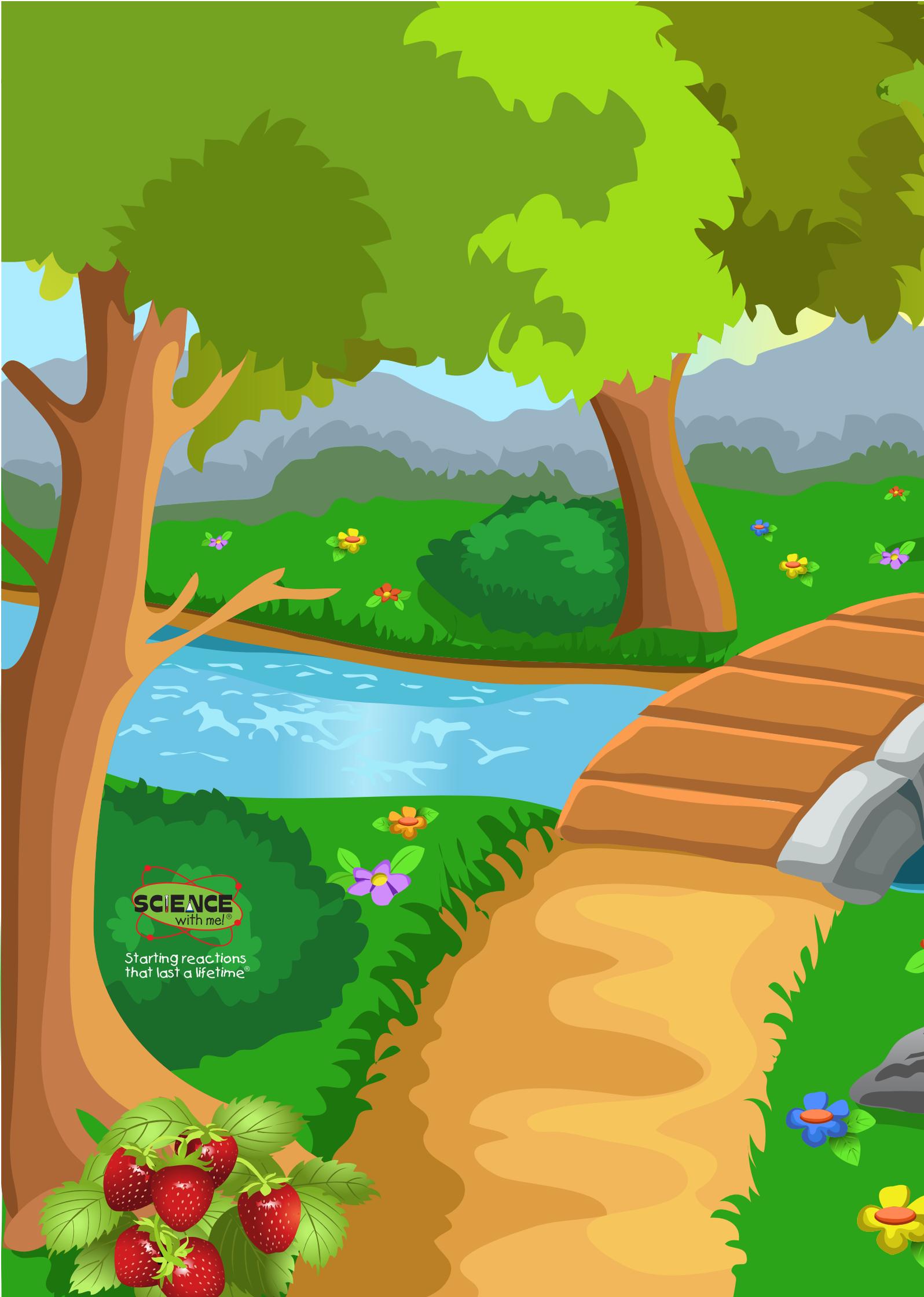


www.sciencewithme.com

Name : _____

Color and Label the Pollination Process





Starting reactions
that last a lifetime®