

PHOTOSYNTHESIS



 *Supermarket*
SCIENCE

Nature's Sugar Factories

Plants Make Their Own Food

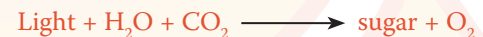
People, like other animals, need food to survive. Plants also need food, but they don't eat. Plants are able to make their own food. They are **producers**—organisms able to produce their own food. Animals are **consumers**—organisms that need to consume other organisms to live. Some animals can eat other animals, these are **carnivores**. Other animals eat only plants, these are **herbivores**. And then there are those that can eat both plants and animals, there are **omnivores**. Human beings are omnivores. We can eat both plants and animals, although we may choose not to eat certain foods—**vegetarians**, for example, are people who decided not to eat animals.

Without producers, plants that make their own food, all other living things on our planet would die.

Can you explain why this would be true? _____

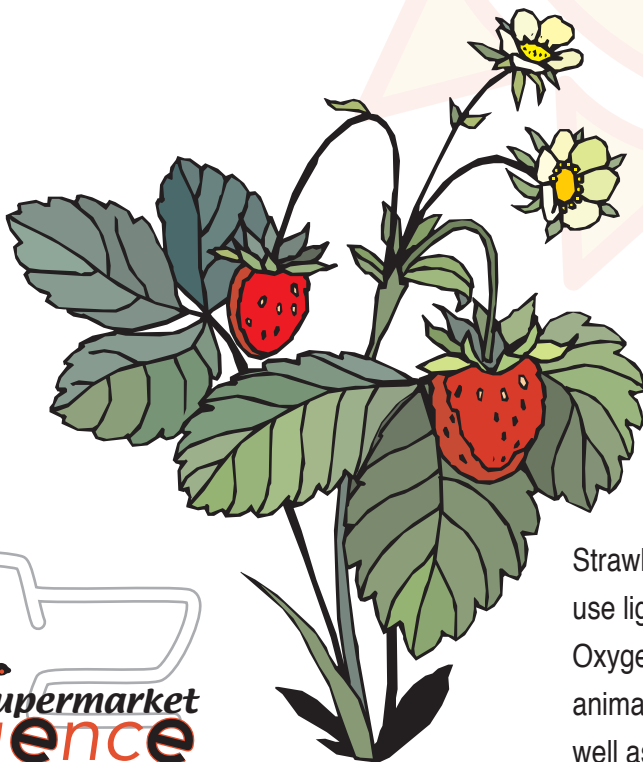
Photosynthesis

Photosynthesis literally means “to make from light.” It's a **process** by which plants use light to make sugar. In addition to light, plants need water and **carbon dioxide** (a gas found in our **atmosphere**). The **energy** from light supports a **chemical reaction** in which water and carbon dioxide **molecules** combine together to produce sugar molecules and release oxygen molecules:



But if this is so simple, why can't animals do it? Why can't we?

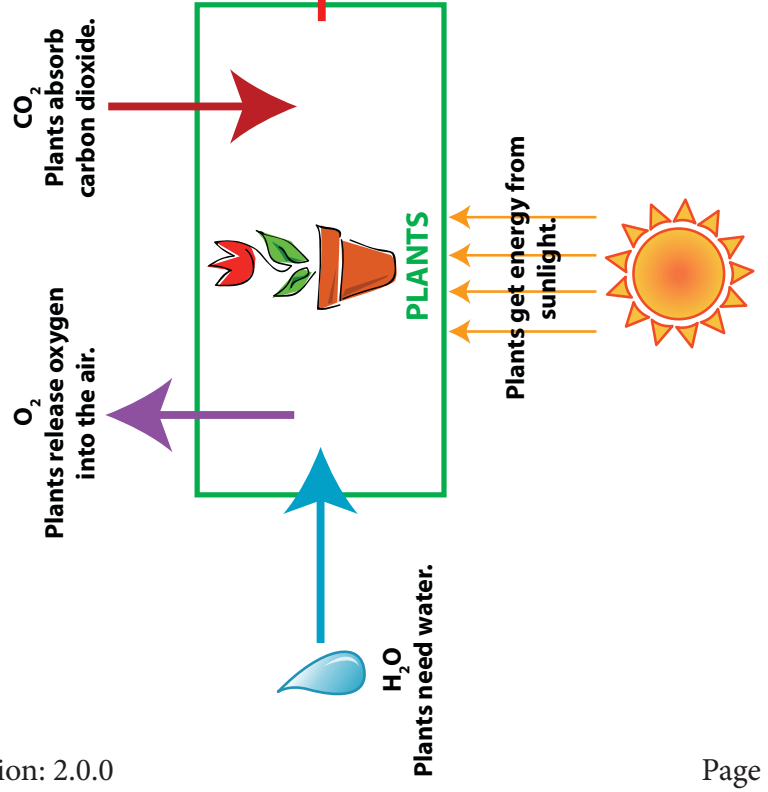
Animals lack the necessary equipment to do photosynthesis. **Plants** have special organs that support the sugar producing chemical reaction. Inside plants' leaves, there are cells called **chloroplasts** which contain a green pigment called **chlorophyll**. When chlorophyll is exposed to light, it breaks down the water molecules into their components, hydrogen and oxygen. Tiny openings called **stomata** let carbon dioxide into the plant's leaves, where they can combine with **oxygen** and **hydrogen** to make **sugar** molecules. Extra oxygen is released back into the air through the same stomata. This whole process, called photosynthesis, occurs in just a fraction of a second. Photosynthesis is one of the fastest chemical reactions observed in nature!



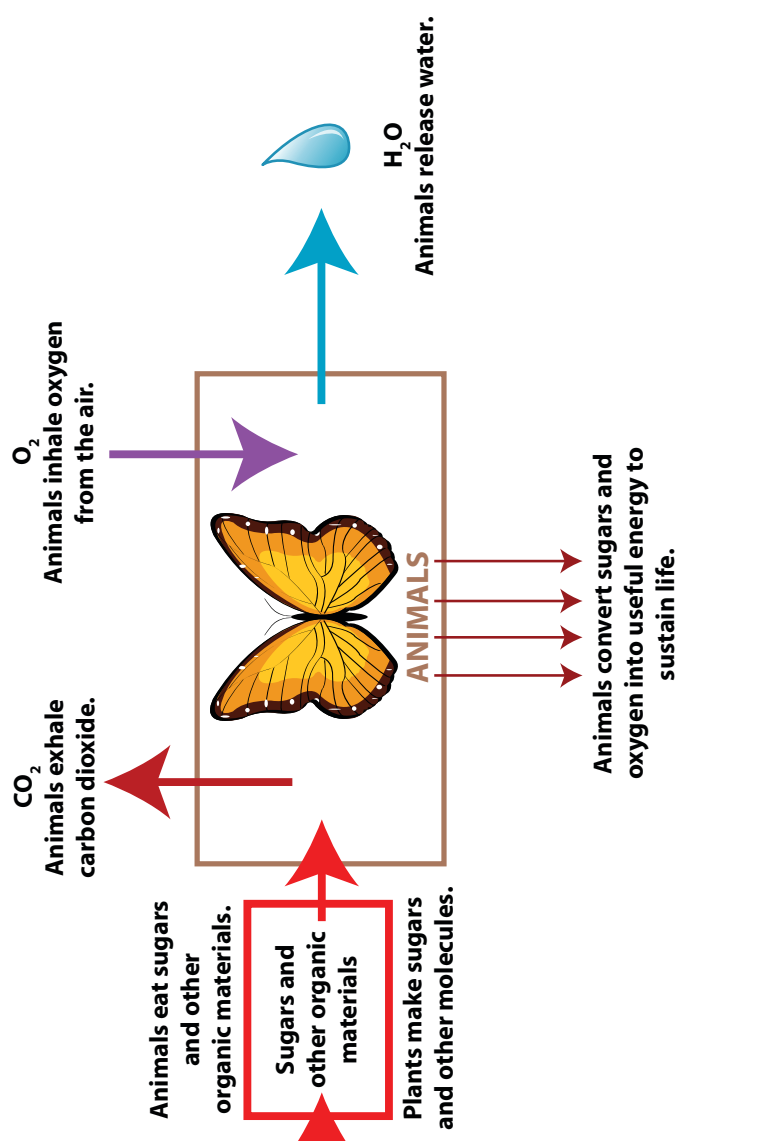
Strawberry plants use the energy from the sun to grow. They use light, water, and carbon dioxide to make sugar and oxygen. Oxygen gets released back into the air, and we and all other animals inhale it. The sugar in the plant is used to make it grow as well as to make delicious strawberries that animals like to eat.



PHOTOSYNTHESIS



RESPIRATION



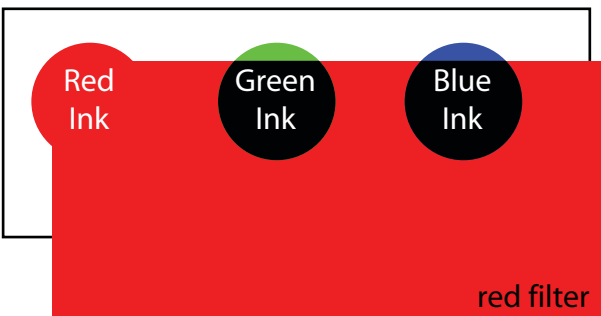
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The Right Light

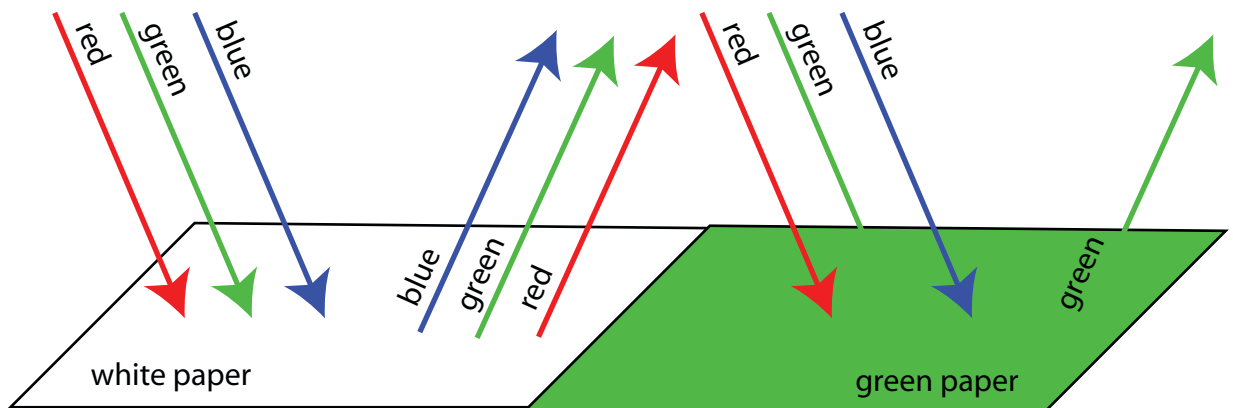
White light is made out of all the colors of the rainbow. When white light passes through a prism, we can see it spread out on the other side into its different colored components. Red, green, and blue are the colors of light which aren't mixtures of any of the others colors. They are called **primaries**.



When you look at anything, what you're seeing is the light that bounces off of the object and into your eyes. Imagine you're looking at a white sheet of paper with big colored dots on it. The white parts of the paper are reflecting all the colors which fall on it—so they look white. A red dot on the page reflects only the red light. The other colors are absorbed into the paper. So only red light bounces off and hits your eyes—it looks red. Green dots only reflect green and blue dots only reflect blue.



An object is a particular color because of the color of the light it reflects. So lemons look yellow because they reflect red and green light and **absorb** blue light. If you shine only green light on a lemon, it will look green. Why? Because lemons (yellow) **reflect** red and green light. If you shine only blue light on a lemon, it will look black. Why? Because the lemon absorbs the blue light and there's nothing to reflect back. When an object looks black, it means that it absorbs all of the colors in the **light** that illuminates it and doesn't reflect any back. A white object reflects all of the colors in the light that strikes it.



Green plants absorb red and blue light and reflect green light—that's why they look green. Photosynthesis, the process by which plants make sugar using sunlight, only needs red and blue light. The other colors are not necessary!

DO



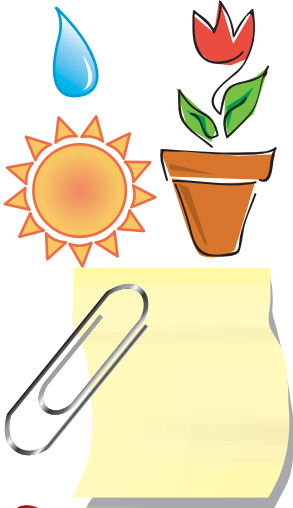
Light & Leaves

Photosynthesis doesn't use all of the light produced by the sun. Only red and blue light is needed to support this **process**. The leaves appear green because it's the only color that doesn't get absorbed by the plant.



Sun light is composed of all the colors of the rainbow. When you mix red light, green light, and blue light, you get white light!

What You Need:



Are there any differences in color of the leaf under the red filter, green filter, blue filter, and plain paper pieces? How does the color compare to regular, uncovered leaf portion?

What do you think would happen if you grow a potato in a green transparent box? What color leaves would it have?

