

# Looking at Leaves



## Submitted By:

Stephanie Bradley, Wild Learning Project

## Overview

Students will gather leaves looking for differences in shape, color, size and texture. Students will complete various science experiments and activities to learn how leaves change color and how people can identify different trees by looking at their leaves.

## Grade Levels

Kindergarten and 1<sup>st</sup> grade

## Curriculum Correlation

K.P.2.1 and 1.L.2.1

## Duration

1 to 2 class periods

## Location

Classroom and outdoors

## Materials

Experiment #1: The Black Marker Experiment: Paper towel, A black marker (not a permanent marker), and water in spray bottle or dropper.

Experiment #2: Leaf Chromatography: Glass Jars, Coffee Filters , Leaves, Rubbing Alcohol, Mortar and pestle or spoon, Notebook and Pencil to Record Observations

Sorting and Graphing Leaves Activity: Large poster paper or white board for graphing results, and markers, tree or leaf identification cards/books.

Leaf Rubbing and Measurement Activity: Leaves, ruler, paper, crayons, and Leaf ID cards

# Looking at Leaves



## Learning Targets

Students should know what leaves do for a tree. They make food through the process of photosynthesis and they inhale carbon monoxide and exhale oxygen.

Students should know that leaves come in different shapes, colors, and textures and that people can use this information to identify what species of tree it is.

Students should know how and why some leaves change color in the fall.

## Educators Information

Leaves provide food and air to help a plant /tree stay healthy and grow. Through photosynthesis, leaves turn light energy into food. Through pores, or stomata, leaves “breathe” in carbon dioxide and “breathe” out oxygen. Leaves also release excess water, much like we sweat.

Plants are responsible for creating the oxygen that we breathe. They do this by absorbing water from the ground and carbon dioxide from the air. Using sunlight (through photosynthesis) they turn water and carbon dioxide into oxygen and glucose. Oxygen is what we need to breathe and glucose is what the plant uses to grow. The term photosynthesis means "putting together with light". The chemical that plants use to make photosynthesis is chlorophyll. Chlorophyll is the same chemical that gives plants their green color.

Photosynthesis is the process in which plants convert light energy from the sun to chemical food energy. To absorb the light, leaves use brightly colored pigments with chlorophyll being the most important one.

There are two main types of chlorophyll: chlorophyll A which is bluish-green, and chlorophyll B, which is yellowish-green. During most of the growing season, leaves contain more chlorophyll than any other pigment, making them appear green.

In the fall, chlorophyll begins to break down, and the other pigments, which have been there all along, are finally revealed. Yellow leaves have pigments called xanthophyll,

# Looking at Leaves



orange leaves have a pigment called carotenoids. Anthocyanins, give leaves their intense red and purple pigments.

These pigments, however, aren't present in the leaves during the summer and are only made toward the end of summer.

Chromatography is the separation of a dissolved mixture by passing a through filter paper through which different parts of the mixture will move at different rates. The pigments that were more soluble in the solvent (rubbing alcohol) moved further up the paper than the less soluble pigments. Using the green leaf as an example, the blueish-green chlorophyll A was less soluble than the yellowish green chlorophyll B and thus it didn't move as far up the paper.

\*This information about photosynthesis, chlorophyll, and chromatography is from Playdough to Plato, <https://www.playdoughtoplato.com/>



## Procedure

This lesson is best done in fall when leaves are starting to change color.

Begin with a class discussion on leaves; what their job is and how they do their job. I like to get students excited about the topic by preparing a paper bag of leaves for students to study. Make sure you have 1 leaf per student. Pass the paper bag around and have each student pick out a leaf. Tell students they should study their leaf. Look for imperfections as they will soon have to find their leaf. Once everyone has had a few minutes to study and memorize their leaf, have them put it back in the paper bag. Shake up the bag and pour its contents on the floor or table in front of you. Tell students that they must now find their leaf. Once everyone thinks they have found their leaf, ask them to explain how they knew that leaf was theirs. This can be a good transition for talking about differences within a species, such as red maple leaves are all shaped the same but different things happen to them to make them unique such as weather conditions and insect activity.

Next you can discuss how some of your leaves may be different colors and why that is. Here is a fun hand-on activity to get started with the leaf color change topic. This activity

# Looking at Leaves



is from Gift of Curiosity and you can find the Free leaf printable here, <https://www.giftofcuriosity.com/product/why-fall-leaves-change-colors/>

You may have experienced a tree turning from green to yellow during the fall. But did you know that the yellow colors that suddenly appear were actually in the leaf the entire time? It's true! The green chlorophyll we see most of the year masks the yellow color, which can only be seen in the fall when the chlorophyll breaks down. This is a simple but effective way to drive home the point that the yellow color that appears in the fall has actually been in the leaf the whole time.

I printed some of the yellow leaves and laminated them with our inexpensive thermal laminator. I then used a green dry erase marker to completely cover the yellow on the leaves. After explaining to my kids why leaves change colors, I handed them the leaf I had colored green. I told them the leaf was green because it still had all its chlorophyll, but fall was coming and the chlorophyll was starting to break down. I then invited them to use the white board eraser to “break down” the chlorophyll. I literally heard squeals of delight when my kids noticed the yellow color under the green!



## Why Do Leaves Change Color? Experiments

All 3 experiments are from Playdough to Plato, <https://www.playdoughtoplato.com/super-easy-science-experiments-demonstrate-leaves-change-color/>

# Looking at Leaves



## Experiment #1: The Black Marker Experiment

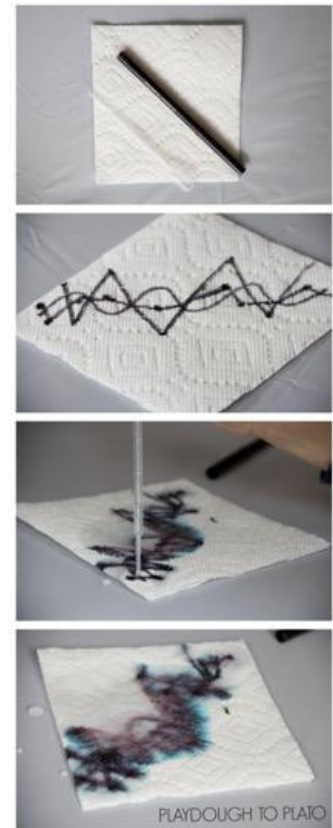
One of the easiest and quickest ways to show children the science behind why leaves change color is: the Black Marker Experiment. This experiment quickly exhibits chromatography. Black separates into a variety of pigments, some quicker than others depending on the molecules within that particular color.

Materials: Paper towel, A black marker (not a permanent marker), and water in spray bottle or dropper.

I like to use a spray bottle or dropper to make it a bit more interactive for the kids and to add a bit of fine motor work into the activity.

The Experiment: Have the children design their paper towels with the black marker. During this time, ask the children, “What is black? What do you think is going to happen when water touches the black?”

Have the children take a medicine dropper or a spray bottle or just use fingers to add water to the paper towel. The water will cause the pigments to reveal themselves at varying rates. Children are memorized by this process. Plus you get a beautiful piece of art as a result.



## Experiment #2: Leaf Chromatography:

While on your nature hunt to collect the leaves for this science project is the perfect opportunity to discuss what jobs leaves are responsible for. Plants are responsible for creating the oxygen that we breathe. They do this by absorbing water from the ground and carbon dioxide from the air. Using sunlight (through photosynthesis) they turn water and carbon dioxide into oxygen and glucose. Oxygen is what we need to breathe and glucose is what the plant uses to grow. The term photosynthesis means "putting together with light". The chemical that plants use to make photosynthesis is chlorophyll. Chlorophyll is the same chemical that gives plants their green color.

# Looking at Leaves



Materials: Glass Jars, Coffee Filters, Leaves, Rubbing Alcohol, Mortar and pestle or spoon, Notebook and Pencil to Record Observations

Getting Ready: Have students gather a few leaves each that have already changed color as well as a few green leaves. Once students have collected the leaves you can have them sort them by color and chose the best leaf from each color to test.

The Experiment: Decide on a color to start with, have students take turns tearing up the leaves, placing it into a mortar, and crushing the bits up to release their juices with a pestle. (If you don't have a mortar and pestle place your leaf bits into a glass and crush them with the back of a spoon.)

Once done crushing the leaf bits, place them into a glass and repeated the process with all the other colored leaves.

As students finish smashing bits of the various colored leaves, label each glass by taping on a matching leaf to the back of the glass so you can remember what the leaf looked like.

Now comes the stinky part of the experiment! Carefully pour a couple tablespoons of rubbing alcohol into each glass until the crushed leaf bits are covered.

Next, the teacher should place the glasses in Pyrex dishes and pour boiling water around (not in!) the glasses to warm up the alcohol. By warming the rubbing alcohol, you speed up the process of drawing the pigments out of the leaves. You can also cover the glasses with plastic wrap and wait overnight for the pigments to dissolve in the alcohol.

After about 30 minutes, you should see the leaves' pigments color the alcohol.

The teacher or students should cut 1 inch by 5 inch strips from white coffee filters to use as your chromatography paper. Show students how to place one end in the solvent (rubbing alcohol) and drape the other over the edge of the Pyrex. After students place one strip in each glass, all you have to do is wait. We ended up starting this experiment in the afternoon so we just left it overnight, but an hour or two is usually enough time.





# Looking at Leaves



In the morning, we pulled out the filter strips to see what had happened.

The alcohol had carried the pigments from the leaves up the paper and separated them into bands. The purple and orange had the most dramatic bands. You could even see the two different kinds of chlorophyll on the paper from the green leaf. This experiment was so much fun we plan to do it again using a single leaf with multiple colors to see what pigments we can separate.



## Experiment #3: Get Outside for Leaf Sequencing

This activity is a great one to get kids outside and moving their bodies. Simply challenge the children to gather many leaves of various colors over a period of ten minutes. Gather back together to examine the leaves.

Ask, “What is happening to this green and yellow leaf? Why is this leaf turning red? Why is this leaf still green?”

Then sequence the leaves by the stage of color change.

Here you can purchase Leaf Color Sequencing Cards for \$1,  
<https://welcometomommyhood.com/product/shades-of-leaves-printables>

# Looking at Leaves



## Sorting and Graphing Leaves Activity

Procedure: Once you have completed all 3 experiments and have gathered leaves to sequence their stages of color change, you can have students talk about other ways they could sort the leaves. Explain to students that leaves are one way people identify certain tree species. Point out the different shapes, colors, and sizes of leaves. Ask students if all tree leaves change color in the fall? Explain that leaves that change color in the fall are deciduous trees and leaves that stay green through the winter are evergreen. See if students can sort the leaves they have gathered by color and deciduous vs. evergreen.

Materials: Large poster paper or white board for graphing results, and markers, tree or leaf identification cards/books.



## Leaf Rubbing and Measurement Activity

Set up a station inside the classroom where students can measure different leaves and sort them from smallest to biggest. Once student have measured the leaf they can do a leaf rubbing in their journal. To advance the activity you can plan to offer leaves that you have ID cards for and see if students can ID the leaf they are measuring and rubbing in to their journal. To do a leaf rubbing you need to place the leaf under your piece of paper. You then rub a crayon (it is best on the side of the crayon) over the leaf. You should see the outline of the leaf and any prominent veins in the leaf.



# Looking at Leaves



Materials: Leaves, ruler, paper, crayons, and Leaf ID cards



Photo from Scientific America



## Supplemental Reading

[Why Do Leaves Change Color?](#) by Betsy Maestro

[We're Going on a Leaf Hunt](#) by Steve Metzger



## Extensions

Free Printable Tree Book; this is a cute printable booklet with pockets so students can gather different parts of a tree. <https://www.teacherspayteachers.com/Product/My-Tree-Book-Freebie-1507104>



## Resources

[Leaf and Tree ID Cards:](#)

Free Printable: <https://preschoolmom.com/PreschoolPrintables/FallLeaves>

Free Printable: <https://www.mamaslearningcorner.com/leaf-identification-cards/>

# Looking at Leaves



Purchasable: <https://www.tanglewoodhollow.com/products/leaf-seed-identification-cards>

Purchasable: <https://montessoriprintshopusa.com/products/leaf-shapes-leaves>

Purchasable: <https://www.shop.montessoriprintshop.com/Tree-Identification-Cards-Set-2-SCF-48.htm?categoryId=-1>