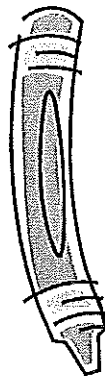


# Nature Kids

## Leafy science projects

In the fall, some tree leaves turn from green to yellow, orange, red or brown.  
Here are some crafts and experiments you can do with leaves.

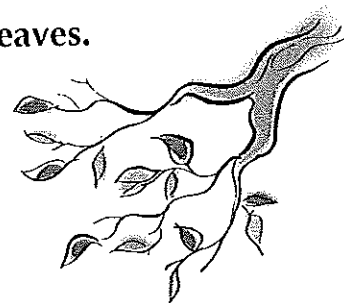


### Leaf Rubbings

#### Materials:

Fallen leaves - soft, not crunchy  
Crayons  
Paper

On a smooth hard surface (like a table or a clip board) place a leaf upside down, so the veins show. Lay a piece of paper over the leaf and rub with a crayon. You might try to make your rubbing the same color as the leaf itself.

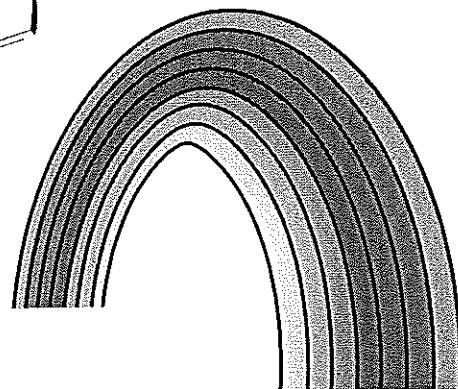
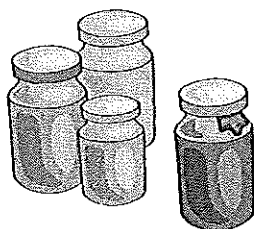
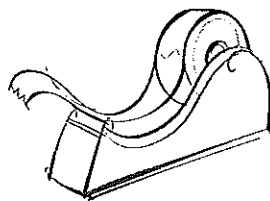
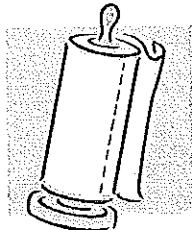


### Leaf Color Chromatography

A cool way to separate the colors in a leaf.  
From [www.sciencemadesimple.com](http://www.sciencemadesimple.com)

#### Materials:

Leaves - especially ones with fall colors  
Paper coffee filters or paper towels  
Small jars - like baby food jars  
Shallow baking pan  
Lids or aluminum foil  
Hot tap water  
Rubbing alcohol  
Plastic knife or spoon  
Tape  
Pen  
Clock or timer



#### Procedure:

1. Collect several different kinds of leaves. Tear or chop each kind of leaf into very small pieces and put them in jars. Label the jars with the name of each leaf (if you know it).
2. Add enough alcohol to each jar to cover the leaves. (Alcohol can be dangerous if misused. Read and follow all warnings on bottle).
3. Cover the jars loosely and place into shallow pan filled with one inch of hot tap water (about 125° F).
4. Keep the jars in the hot water until the alcohol has become dark (at least 30 minutes). Swirl the alcohol/leaf mixture in each jar every five minutes or so. Replace the hot water if it cools off.
5. Cut a long thin strip of coffee filter or towel for each jar and label it to match the jar label.
6. Remove the jars from the water and uncover. Place one end of a filter strip in the alcohol in each jar. Bend the other end over the top and tape it to the jar.
7. Wait an hour or two (Play outside or make some leaf rubbings). The alcohol will travel up the leaf and the colors will travel with it. Each color travels a different distance, so you should be able to see different shades of green, yellow, orange, and even red.



## Happy Fall!

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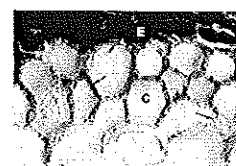
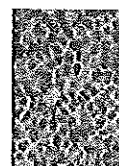
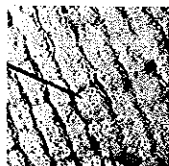
# Teacher's Corner

## Why some leaves change color in the fall

Leaf color comes from pigments - natural chemical compounds produced by the leaf cells that give the leaf color (*we use the same word for the colors in paints.*).

The pigments that give leaves their color are:

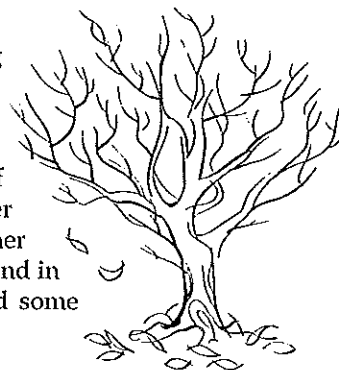
- chlorophyll - green
- carotenoid and xanthophyll - orange, yellow
- anthocyanins - red, purple
- tannins - browns



Chlorophyll is the chemical in the leaves that uses energy from the sun to combine carbon dioxide (from the air) and water (drawn up through the roots) to form glucose (with leftover oxygen) in the process called photosynthesis. In the course of making glucose, the chlorophyll turns bright green. This gives the leaves their familiar hue.

In the fall, the days shorten and the nights grow longer. Trees respond to the decreasing day length by producing less and less chlorophyll. Eventually, a tree stops producing chlorophyll altogether. Then the carotenoid and xanthophyll already in the leaves can show through. Carotenoid and xanthophyll are the sources of bright yellow and orange coloring in fruits and vegetables, including corn, carrots and bananas, and in egg yolks. They are in the leaves all the time, but we don't really know why. Perhaps they play a part in photosynthesis. Different combinations of these chemicals give us a wide range of warm fall colors.

Anthocyanins (reds and purples) are a different story. They are not produced in the leaves during the spring and summer like the carotenoid. They are formed from the glucose left in the leaf after the chlorophyll disappears. Why would a plant use energy to make this chemical if the leaf is going to fall off soon anyway? Again, we don't know for sure. Some scientists think that the anthocyanins help the leaf stay attached to the tree a little longer. That gives the tree more time to remove more of the sugars (glucose), nitrogen and other valuable chemicals from the leaf before it drops off. Other scientists think that the anthocyanins seep into the soil as the fallen leaves decay and prevent other plants from growing near the tree the following spring. Anthocyanins are important antioxidants found in lots of red and purple fruits and vegetables - beets, red apples, purple grapes (and red wine) and some flowers like hyacinths and violets.



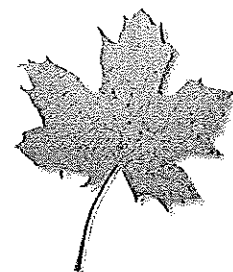
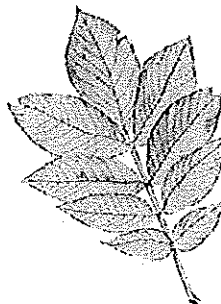
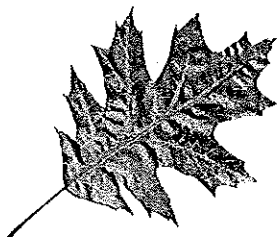
Brown colors come from tannins, a waste product of photosynthesis that gives the bitter taste to black tea, and the brown color to some pond water.

While we always get yellows and oranges, some autumns produce spectacular reds and purples and others appear much less bright. The year's weather is the key. The best weather for fall color: a warm wet spring; a mild summer; and a fall with plenty of warm, sunny days and cool nights.

You can use fall leaf colors to help identify trees:

### Fall leaf color key:

- Oaks - red or brown
- Hickories - golden bronze
- Pecans - yellow
- Maples - red to orange



Look at the trees in your area - what colors do their leaves turn?

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See the "Nature Kids" page for instructions to make your own Leafy science projects!