Learning about Leaves

Resource Packet

Medina County Park District

Packet Includes:

Learning Resources

- Why do Leaves Change Color? fact sheet
- Parts of a Leaf diagram and definitions
- Types of Leaves diagram and definitions

Activities

- Science Experiment: Why Do leaves Change Color?
- Art Project: Autumn Leaves STEAM Absorption Art
- Vocabulary Extension: Parts of a Leaf Word Match
- Scavenger Hunt: Looking for Leaf Shapes

Why do leaves change color in the Autumn?

Most of the spectacular colors of autumn have actually been in the leaves all summer, however they were “covered up” by the dominant green of the chlorophyl. As weather cools, and shorter days settle in, the chlorophyll begins to break down, revealing new and varied color pigments.The brightest colors are seen when late summer is dry, and autumn has bright sunny days and cool nights.

White Birch

GREEN - Chlorophyl

Chlorophyll is responsible for helping trees and plants turn sunlight into food. For most months, it is the dominant color seen in most leaves until it fades away. As many trees shut down their food production, they turn to stored sugars to survive the winter.

Swamp Chestnut Oak

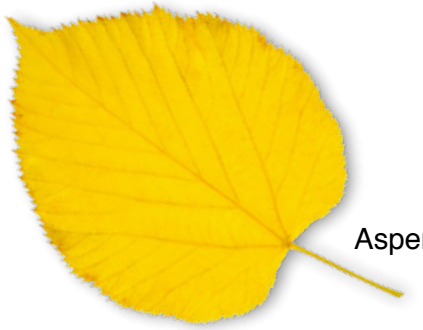
RED - Anthocyanin

Unlike other leaf colors that always exist in the leaf, anthocyanins are produced as the chlorophyl is broken down. The anthocyanins are often seen in leaves named for their autumn splash of red including Red Maples, Scarlet Oaks, and Red Sumacs.

Sugar Maple

ORANGE - Carotene

Sugar Maples may be one of the best examples of carotene in action. Their bright signature orange fills many hills and country roads throughout the northern US. Sassafras leaves also turn a slightly more muted orange. As its name implies, Carotenes are also the chemical responsible for giving carrots their unique coloring.



Aspen

YELLOW - Xanthophyll

Xanthophyll can be seen throughout the fall in trees including beeches, ashes, birches, aspens, and some oaks. It also contributes its bright yellow color to autumn squash and corn.

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Parts of a Leaf

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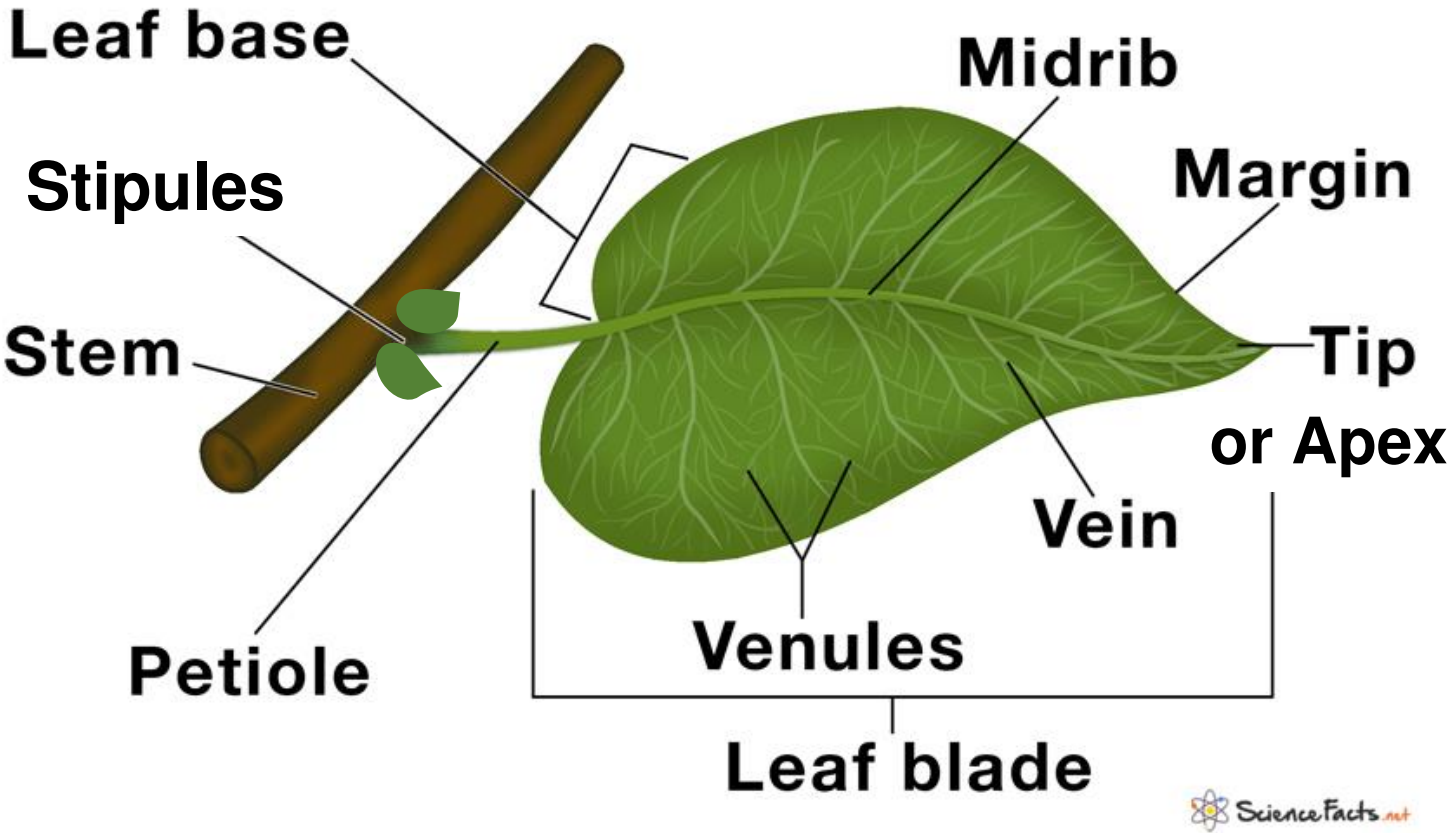

Diagram image courtesy of:
https://www.sciencefacts.net/parts-of-a-leaf.html

Apex or Tip - The outer end of a leaf; the tip of the leaf blade

Base - It is the lowermost part of a leaf that is closest to the petiole.

Lamina or Leaf Blade - The thin, flat part of the leaf that is typically green in color. It is further divided into three parts: apex, margin, veins.

Margin - The edge of the leaf

Midrib - The central rib of a leaf; it is usually continuous with the petiole.

Petiole - A leaf stalk; it attaches the leaf to the plant.

Stem - The main support of the plant

Stipule - The small, paired appendages (sometimes leaf-life) that are found at the base of the petiole of leaves of many flowering plants

Vein - One of the many vascular structures on a leaf; provides support for the leaf and transports both water and food through the leaf; further subdivided into venules

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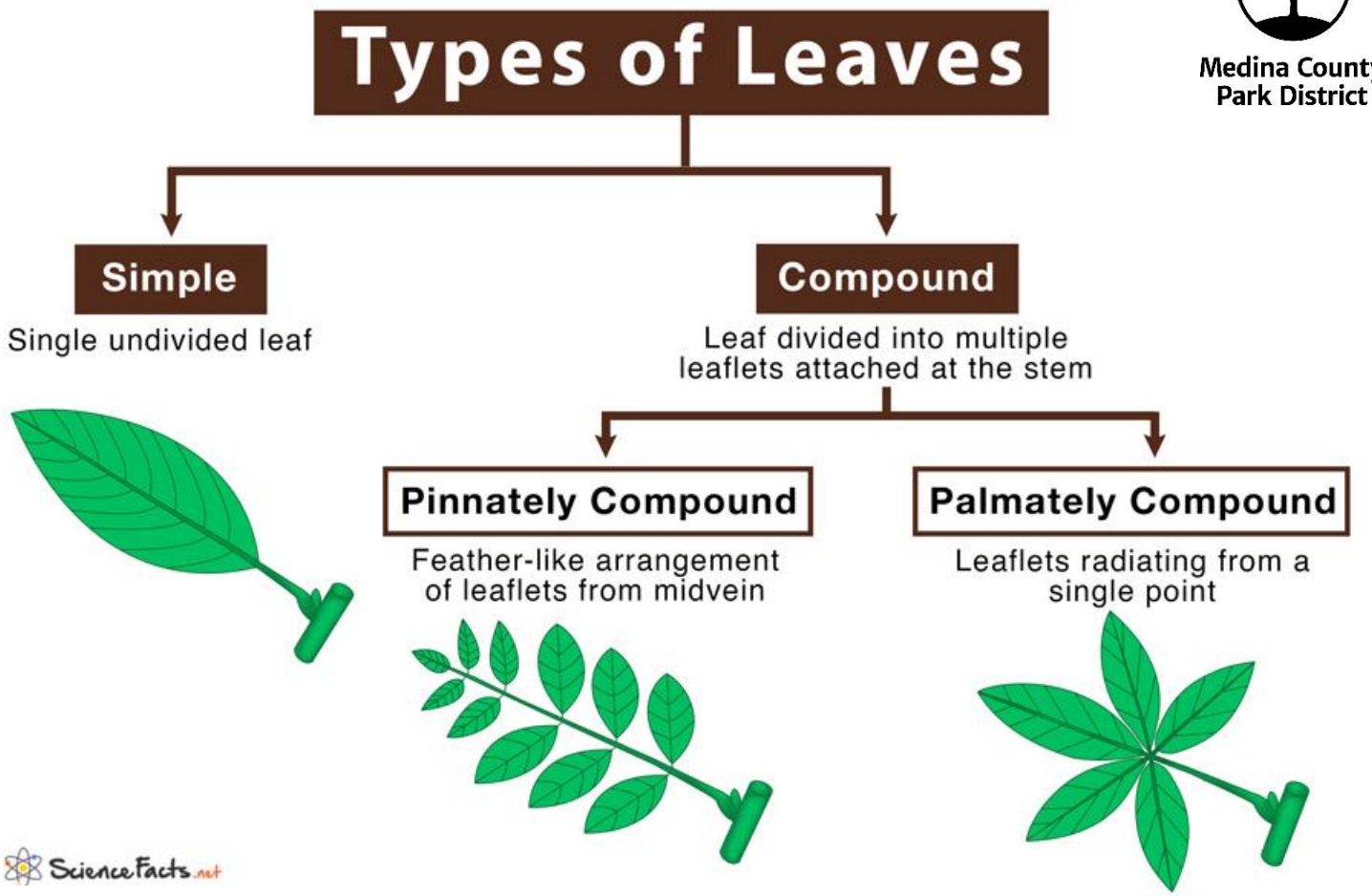

Diagram image courtesy of:
https://www.sciencefacts.net/wp-content/uploads/2019/12/Types-of-Leaves.jpg

Simple Leaves - A single leaf directly attached to the stem; it is always attached to a twig by its stem or the petiole

Examples: Maple, oak, black cherry, black gum, sweet gum, elm, beech, tulip poplar, and sycamore

Compound Leaves – A leaf that is composed of multiple leaflets attached to the midrib and having their own stalks.

Examples: Poison ivy, horse chestnut, ash, locust, hickory, buckeye, and sumac

Based on the way leaflets are attached, **compound** leaves are further classified into two types:

a) Palmately compound leaf - Leaflets radiating outward from the end of the petiole; similar to fingers on the palms of our hands

Examples: buckeye, horse chestnut

b) Pinnately compound leaf **-** Leaflets arranged symmetrically along the center of the leaf where each leaflet appears to be attached or pinned to the midrib (a.k.a. rachis), making the leaf look like a fern.

Science Experiment:
Why Do Leaves Change Color?

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Leaves contain chlorophyll. Chlorophyll makes the leaves green and is so dominant that it covers up all the other colors in the leaves. To figure out what color a leaf would be without the dominant chlorophyll color, we can separate the colors by doing this science experiment.

This experiment is very simple, and you likely already have everything you need:

Materials:

3 leaves (from the same tree)
Rubbing alcohol
Glass jar
Plastic baggie (or plastic wrap)
Paper coffee filter
Small bowl or pan
Hot water

Steps:

1. Have your child break the leaves into tiny pieces and put them in the jar.
2. Pour rubbing alcohol over the leaves until they are just covered.
3. Mash and stir the leaves into the rubbing alcohol until the alcohol turns slightly green. Really give it a good mashing – this is key.

4. Cover the jar with the baggie or plastic wrap, place the jar in a small bowl, and pour hot water into the bowl.
5. Leave the jar in the water for 30 minutes. Swish the jar occasionally to stir the leaves a bit. The alcohol should be a very dark green (leave longer if needed). If you can resist, wait 45 minutes or an hour.
6. Cut a strip in the coffee filter so the strip can reach the rubbing alcohol. Place it in the jar like shown in the picture. You can tape the strip to the edge of the jar to hold it in place.

7. The liquid will travel up the coffee filter, and the colors will separate as the alcohol evaporates off the coffee filter. Let this happen for about an hour for the full effect. The leaves we used turn to a beautiful yellow in autumn.

So . . . Why Do Leaves Change Color?

In this science experiment, we used rubbing alcohol and energy (hot water) to separate the colors. You likely saw green, and depending on your leaf type, maybe red, yellow, or orange. As we know, chlorophyll gives leaves their green color and is so dominant that it hides the other colors in the leaves. In the fall, chlorophyll in the leaves breaks down allowing the other colors to finally shine through and show their beautiful reds, yellows, and oranges.

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Art Project:
Autumn Leaves STEAM Absorption Art

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This science-meets-art project is almost magical. Watch as fall colors transform plain white coffee filters into works of art. It's an easy kid activity fit for an autumn day. In fact, it's so easy that you will probably end up with a big, leafy pile in no time.

Supplies:

Coffee filters
Markers
Cup of water
Scissors
Leaf template or cookie cutter for tracing

Directions:

Use the leaf template to trace or draw your own leaf shapes on the coffee filter. You can do these one at a time (easiest for little ones) or layer the filters up to five or six deep, trace the leaf on the top filter, and carefully cut all of the shapes out all at once.

Use the markers to make a doughnut ring in the middle of the leaf. Draw a circle in the middle, then trace around it a few times. Make sure the inside of the circle is not filled in as well as the rest of the leaf because you want to leave room for the color to travel up the leaf. Let kids experiment and try several colors at a time if they want.

Fold the leaf three times (in half, in half, and in half again) making a point in the middle of the circle.

Carefully dip your leaf in the water so that only the white tip of the circle touches. The water should start to travel up the coffee filter leaf and spread the ink throughout. It only takes a minute for the leaf to be completely saturated. You may want to have a few extra coffee filters on hand just in case one gets dropped into the glass of water by accident!

Remove the leaf from the water, and let it dry. Once the leaf is dry, carefully unfold it and enjoy. Use your leaves in other crafts or make a collage with them.

The science part of it:

This is a perfect visual representation for young children of how water travels through leaves as it carries the marker to the ends of the leaf (transpiration), making it soft and supple like our wet coffee filter, and exits through holes (stomata) making the leaf crisp like our dry coffee filter.

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Vocabulary Extension:

Parts of a Leaf Word Match

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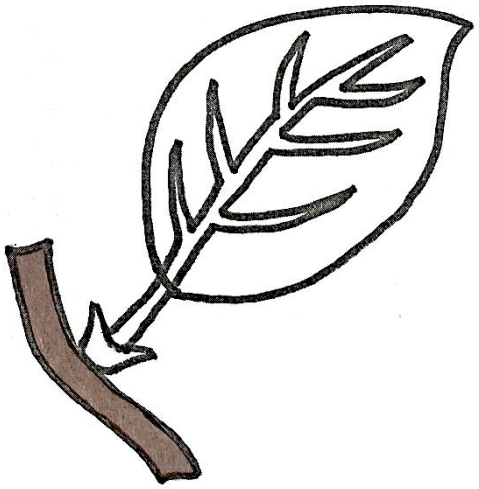
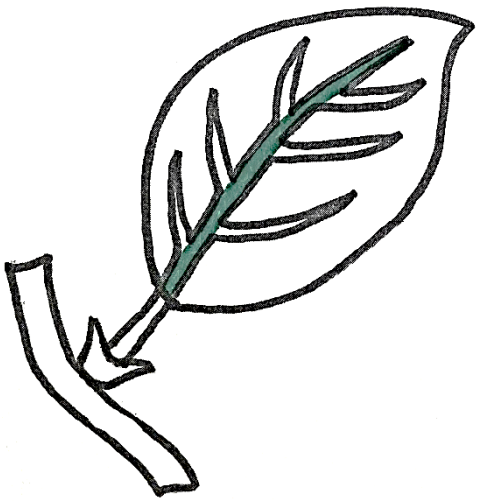
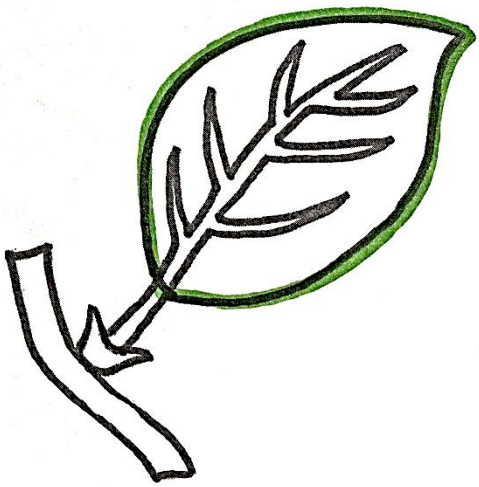
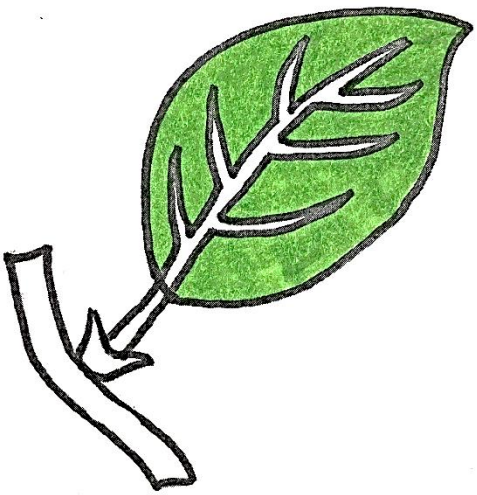
Cut out leaves and leaf part words. Look at the colored part of each leaf, then match it to the correct leaf part word.

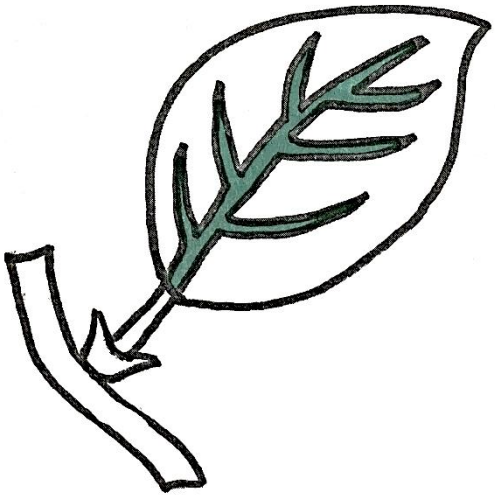
STEM	**STIPULE**	**MARGIN**	**MIDRIB**	**VEINS**
APEX or TIP	**LEAF BASE**	**LEAF BLADE**	**PETIOLE**	**LEAF**

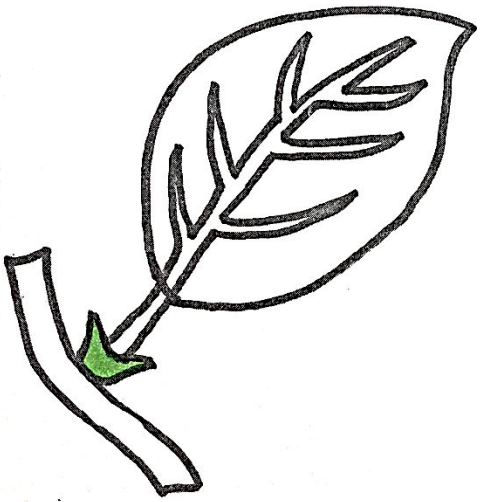


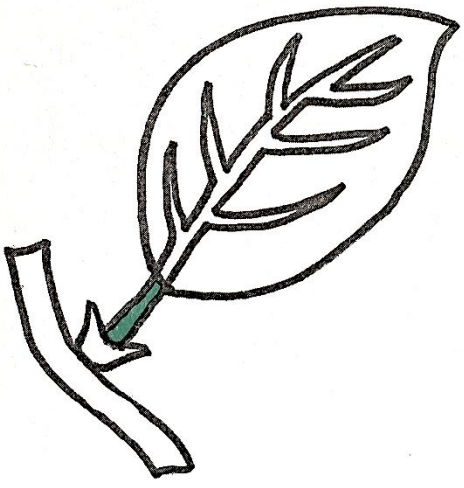












Scavenger Hunt:
Looking for Leaf Shapes

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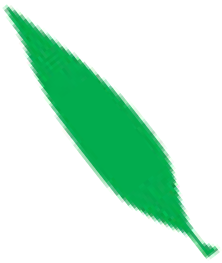
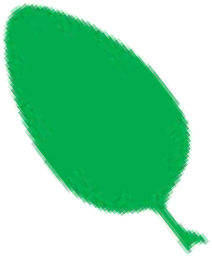
Leaf shapes are helpful in tree/plant identification. Go on a scavenger hunt to find tree leaves with the following shapes. The margins of leaves may be smooth or serrated. This helps identify them, too!

Go one step further on your learning journey by borrowing a tree identification book from your local library and identifying which tree each leaf is from.

❑  **Lanceolate**	❑  **Ovate**	❑ **Eliptic**	❑ **Cordate**
❑ **Flabelate**	❑ **Deltoid**	❑ **Simple Palmate**	❑ **Lobed**
❑ **Compound Palmate or Digitate**	❑ **Odd Pinnate**	❑ **Even Pinnate**	❑ **Bipinnate**