Adirondack Alive
Enchanted Forest Water Safari's Tree Identification Program

New York State is home to nearly 150 tree species. Residents of New York are dependant on many kinds of trees for paper, food and lumber. Trees also provide shelter to both animals and people. They provide shade from the hot summer sun and protect us from the cold winter chills. Trees clean the air we breathe and help us to stay healthy. The Adirondack region contains a wide variety tree types.

View Enchanted Forest Water Safari as a beautiful and thriving living laboratory for your scientific study today. Even New York State's official tree, the Sugar Maple, grows right here! You will learn how to identify tree types, starting with trees growing right here in the park. There are many parts of a tree that can be used for identification – the flower, the leaf, the bark, and its overall shape. Today, you will focus on the how leaves can help you name some of the trees that you will see.

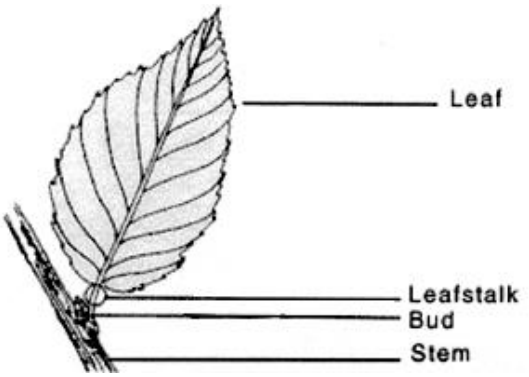
Trees are usually divided into two main groups: **Conifer** and **Broadleaf**.
Conifers have leaves that are needle shaped or scale-like. They are usually evergreen since they do not lose their leaves all at once. The cones of conifers are their fruit. Conifer trees are also generally shaped like a cone (narrow & pointed at the top and wider & rounder at the bottom).
Broadleaf trees lose their leaves once a year, so they are called **deciduous**. The fruit of a broadleaf tree can be a nut, an acorn, a capsule, a berry or a pod. The shape of a broadleaf tree is a wide, spread out top and a trunk at the bottom.

Leaves provide trees with all their food because they turn sunlight into food energy. **Chlorophyll** makes this energy transformation possible. Leaves also make the oxygen in the air that we breathe. **Chlorophyll** is a pigment found in the cells of leaves which is formed only in the presence of light and is the substance that colors plants green. Chlorophyll is contained in chloroplasts and has the property of capturing light energy.

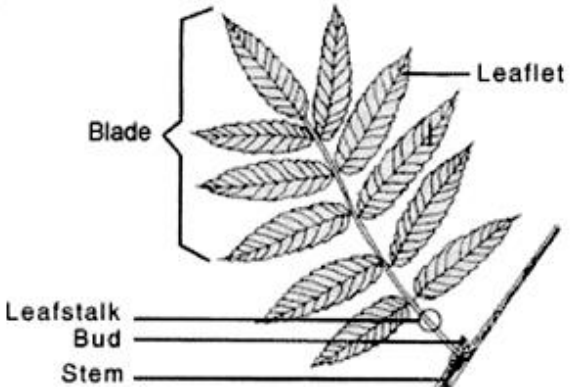
The process of **Photosynthesis** (the process by which plants make sugar from sunlight, water, and carbon dioxide):
Sunlight shines through the top of the leaf and reaches the next layer of cells. The light energy is trapped by the chlorophyll in the **chloroplasts**. In the chloroplasts, a process that uses water changes the light energy into a kind of chemical energy. This chemical energy is stored in the chloroplasts. The chloroplasts use the chemical energy to make food. Air enters the leaf through the **stomata** and moves into tiny spaces around the food-making cells in the leaf. Carbon dioxide from the air passes through the cell walls and membranes of the cells. Carbon dioxide enters the chloroplasts where the previously stored chemical energy converts the carbon dioxide into sugar. Tubes in the plant carry sugar from the leaf cells to other parts of the plant, such as roots, stems, and fruits. Cells in these parts of the tree store some of the sugar.

There are three main parts to a leaf:
The **base** which is the point at which the leaf is joined to the stem. The **stalk** or **petiole** is the thin section joining the base to the lamina - it is generally cylindrical or semicircular in form. The **lamina** or **leaf blade** is the wide part of the leaf – it is the entire leaf unit.

Leaves can be of many different shapes:
Primarily, leaves are divided into **simple** - a single leaf blade with a bud at the base of the leaf stem; or **compound** - a leaf with more than one blade. All blades are attached to a single leaf stem. Where the leaf stem attaches to the twig there is a bud.



Simple Leaf

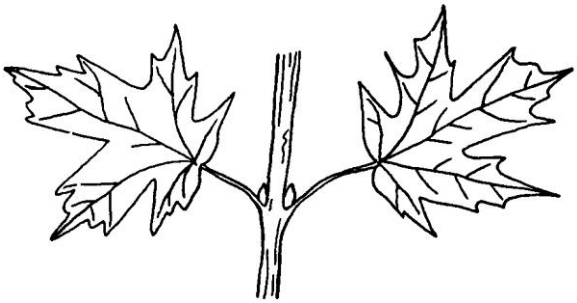


Compound leaf

Leaves may be arranged on the stem either in an **alternate** arrangement - leaves that are staggered or not placed directly across from each other on the twig; or in an **opposite** arrangement - 2 or 3 leaves that are directly across from each other on the same twig.

Leaf Arrangement

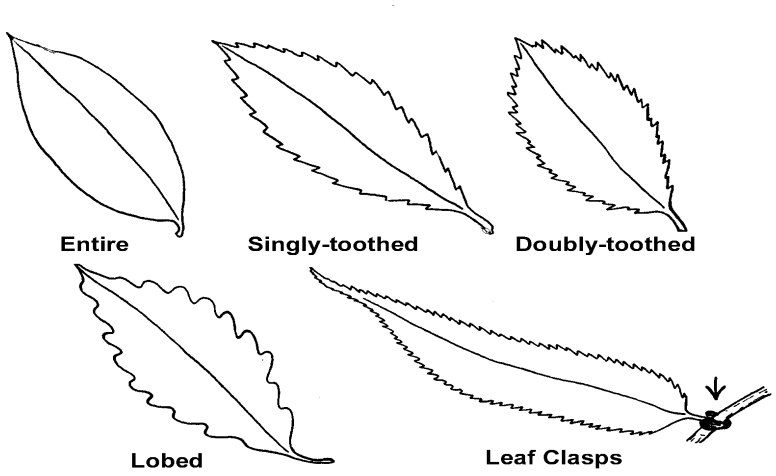
Alternate



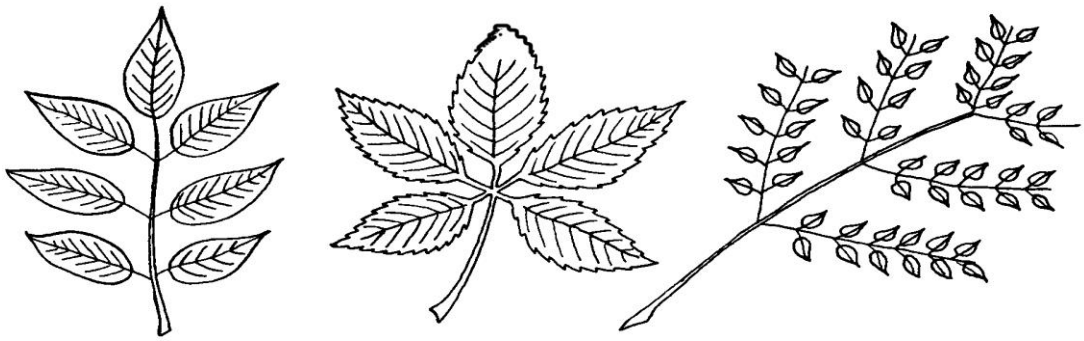
Opposite

The **margin** (the edge of a leaf) may be entire, singly-toothed, doubly-toothed, or lobed.

Simple Leaves - Margin Structure



Compound leaves may be **palmate** - having the leaflets arranged round a single point like fingers on the palm of a hand; or **pinnate** - when the leaves are joined on the two sides of the stalk, like the vanes of a feather.



Pinnate Compound Palmate Compound Doubly-Compound

The form of leaves is related with all their functions and their environment. In addition to photosynthesis, the leaf also carries out all the other exchanges with the atmosphere. It is through the leaf that the plant "breathes" (absorbs oxygen and gives off carbon dioxide plus energy) and transpires. Epidermic tissues in the leaf contain **stomata** - microscopic openings like valves which regulate opening or closing, permitting or preventing transpiration, through which the plant loses the major part of the water it absorbs to allow further absorption by the roots. In most plants the stomata are located on the underside of the leaves. Their function is regulated so that plants living in dry climates have a substantially smaller number of them than those in humid climates, where they are numerous and prominent. Where humidity is low, the stomata may be recessed or partly protected by soft hairs which can prevent excessive transpiration.

A Key to Identify Trees

A Taxonomic Key is a tool that uses the differences among a group of objects (the object for us is trees) to tell you what type of tree you're looking at. The key separates the trees into different categories (based on physical characteristics) until you have only one tree remaining. Enchanted Forest/Water Safari has created a simple Taxonomic Key that uses leaf characteristics of trees found here. For each characteristic, two choices are listed—either the trait is present, or it is not—these are the only two possible choices. The two opposite traits are listed in the Key with the same number (1 and 1, or 2 and 2, etc.). Read both statements carefully before making your choice. When you decide which statement best reflects the leaf of your tree, follow the directions to the next set of statements. If you reach a [**bold**] tree name, you've successfully identified the tree!

1. Leaves are needle-like or scale-like – usually evergreen (go to 2's)
1. Leaves are broad, not needle-like, and are lost in the winter (go to 8's)
2. Leaves are needle-like (much longer than wide) (go to 3's)
2. Leaves are scale-like (almost as wide as long) (go to 7's)
3. Leaves (needles) are in clusters (go to 4's)
3. Leaves (needles) appearing by themselves (go to 5's)
4. Clusters contain 2-5 leaves (needles) (Pines)
    a. Leaves (needles) in clusters of 2. Needles are twisted in shape [**Scotch Pine**]
    b. Leaves (needles) in clusters of 3 [**Pitch Pine**]
    c. Leaves (needles) in clusters of 5 [**White Pine**]
4. Clusters contain more than 5 Leaves (needles), [**Tamarack-Larch**]
5. Leaves (needles) are without stems (go to 6's)
5. Leaves (needles) have short stems [**Redwood**]
6. Leaves (needles) are four-sided and are sharp-pointed (Spruce)
    a. Leaves (needles) are dark yellowish-green [**Engelman Spruce**]
    b. Leaves (needles) are bluish-green or slivery white [**Norway Spruce**]
6. Leaves (needles) are flat and blunt-pointed [**Fir**]
7. Leaves are scale-like, flattened and fan-like & prickly to the touch [**Eastern Cedar**]
8. Arrangement of leaves is opposite (go to 9's)
8. Arrangement of leaves is alternate (go to 10's)
9. Leaves are single (Maples)
    a. pale green under surface, lobes are sparsely toothed, clefts are rounded [**Sugar Maple**]
    b. whitish under surface, usually 3 lobed, clefts are sharp angled [**Silver Maple**]
    c. silvery white under surface, usually 5 lobed, clefts are deep [**Japanese Maple**]
9. Leaves are compound (Ashes, Hickories)
    a. leaflet with stems [**White Ash**]
    b. leaflet without stems [**Black Walnut**]
10. Leaves are simple (go to 11's)
10. Leaves are compound [**Buckeye**]
11. Leaves are lobed, bristle tipped [**Oak**]
11. Leaves are not lobed (go to 12's)
12. Leaves are fine double toothed; all teeth are the same size [**Black Cherry**]
12. Leaves are fine double toothed, small teeth between big teeth, white papery bark [**Paper Birch**]
13. Leaves are fine double toothed, small teeth between big teeth, slivery-yellow bark [**Yellow Birch**]

Putting the Key to Use

There are seven trees at Enchanted Forest Water Safari that are marked for you to identify. Feel free to closely look at our trees, their leaves and bark. Please do not harm our trees by peeling the bark. Start at the front of the park (near Paul Bunyan). To the right of Paul Bunyan, there is the Wish Pond. Directly in front of the Wish Pond, you will see two trees that are marked 'A' and 'B'. Just on the inside of the fence (in front of the Wish Pond, to the right of trees 'A' & 'B') is the tree marked 'C'. Walk up the path past Paul Bunyan, and directly behind Paul Bunyan (on the left) is the house of Sleeping Beauty. In the garden in front of the castle is a tree marked 'D'. Continue down the brick path towards the middle of the park. Stop at the 'Chipmunk Crossing' sign in front of Peter Peter's Pumpkin for tree 'E' (left side of the path). On the right side of the brick path, along the side of the Lazy River on your right, you will see tree 'F'. Continue towards the middle of the park, on the brick path. In the middle, you'll see the Oasis Café. Just past Crossroads Eatery (Funnel Cakes) and the clock, you'll see tree 'G' (across from Pepsi Pounder).

Write your answers in the spaces below.

Tree 'A':_____

Tree 'B':_____

Tree 'C':_____

Tree 'D':_____

Tree 'E':_____

Tree 'F':_____

Tree 'G':_____