



# ***Intro to Leaves***



Leaves are parts of plants. In most plants, leaves are the major sites of photosynthesis, the conversion of energy from sunlight into chemical energy (food). Leaves take in carbon dioxide from the air and produce oxygen through stomata (tiny pores in the leaf). Leaves come in many sizes and shapes; they are often used to help identify plants. Some leaves are flat and wide; others are spiky and thin. Plant spines (like cactus spines) are actually modified leaves. Leaves are also responsible for respiration and transpiration.

Leaves may be simple or compound. Simple leaves have a single blade, while compound leaves have several leaflets. Leaves are attached to the stem of a plant with a short stalk called the petiole. Label and color the stem and petiole light brown on Figure 1. The axil is the angle between the upper side of the stem and a leaf or petiole. Label the axil on Figure 1. The small, paired appendages (sometimes leaf-life) that are found at the base of the petiole of leaves of many flowering plants are called stipules. Label the stipules on Figure 1 and color them yellow. The blade is the wide portion of the leaf and it is also called the lamina. In figure 1, color and label the lamina light green. The outer tip of the blade is called the apex. The midrib is the central rib of a leaf. It is usually continuous with the petiole. Label the apex and midrib on Figure 1. Veins are made of vascular tissue (xylem and phloem). Veins provide supports for the leaf and transport both water and food through the leaf. Label the veins in Figure 1.

The leaf margin is the edge of a leaf. The edge or margin of a leaf can also be used to help identify the leaf. Leaves with rounded teeth on the margin are said to be crenate. Label and color the crenate leaf orange in Figure 2. When the edge of a leaf is smooth and does not have teeth or lobes it is said to be entire. Label and color the leaf with an entire margin light green. The margin of a leaf may be divided into rounded or pointed sections or incisions (cuts) that go less than halfway to the midrib. This type of leaf margin is said to be lobed. Label and color the lobed leaf red. Cleft margins are between the irregular teeth go more than halfway to the midrib. Label the leaf with a cleft margin and color it dark green. When a leaf has small, pointy teeth that point toward the tip of the leaf, it is said to have a serrate or toothed margin. Elm leaves have serrate margins. Label the leaf with a serrate margin and color it light brown.

The whole leaf looks green to us, but most of the cells and cell material are colorless or clear. The green color comes from the chlorophyll molecules in the chloroplasts. The upper surface of a leaf is covered with a waxy cuticle to prevent water loss. A single layer of specialized flattened epidermal cells makes up the upper and lower surfaces of the leaf. Below the upper epidermis are two layers of photosynthetic cells called mesophyll cells. The top layer of mesophyll cells look like bricks standing up on their ends. They are called palisade mesophyll cells and are the site of photosynthesis. Below the palisade mesophyll cells are the spongy mesophyll cells. These cells are irregular in shape and have spaces between them called intercellular spaces. These spaces are filled with gases like oxygen that the leaf is producing and carbon dioxide, which the leaf is using. Running through the leaf are the veins made up of vascular tissue in a bundle. Xylem (water-carrying tubes) is at the top of the vascular bundle, while the phloem (food-carrying tubes) is below xylem in the vascular bundle in cross section of the leaf. On the lower epidermis of the leaf are openings for gas exchange called stomata. On either side of the stomata are two cells called guard cells that help open and close the stomata so the plant will not lose too much water in the heat of the day. Water loss from leaves is called transpiration and causes the plant to wilt as it loses turgor pressure and the cell membrane pulls away from the plant cell walls.

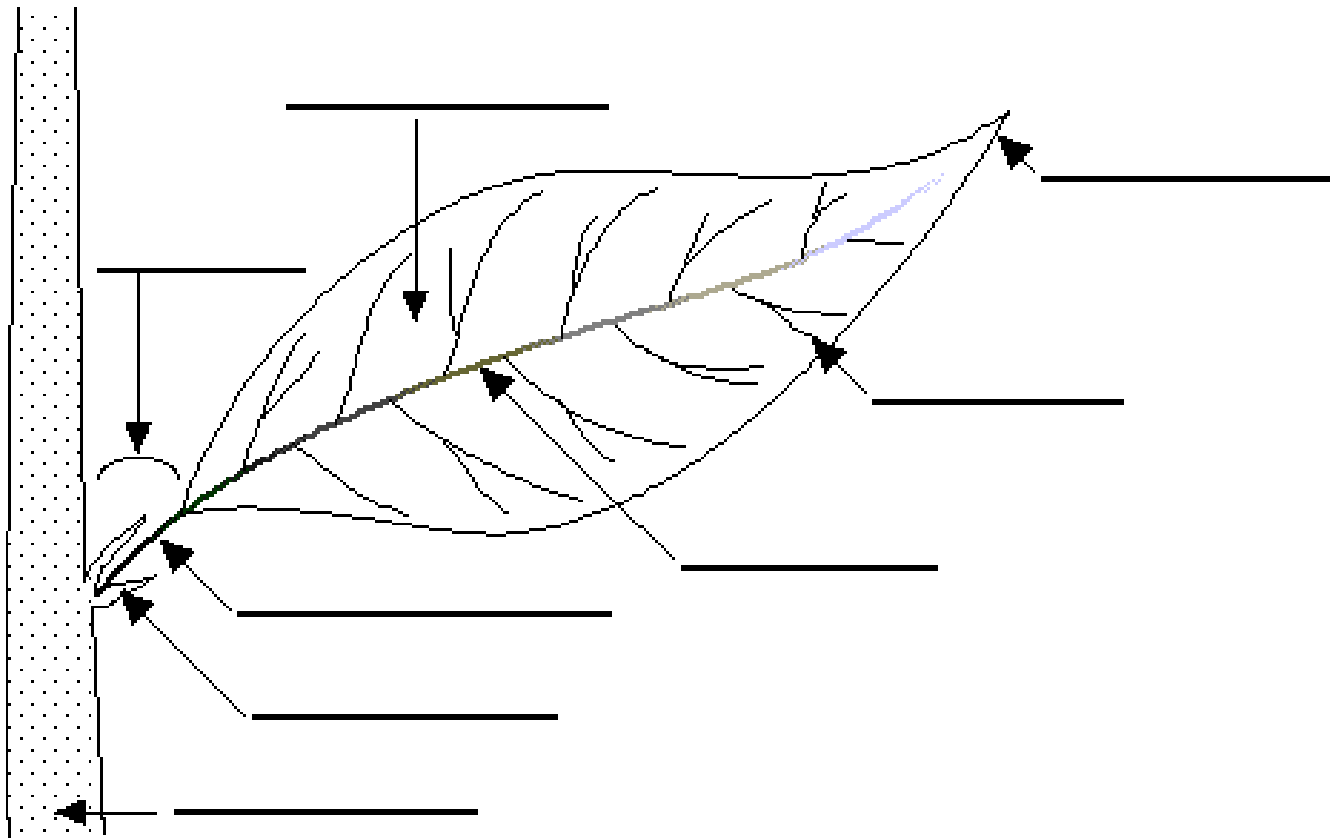
The petiole of the leaf attaches to the stem at a place called the node. The distance between one node (site of leaf attachment) and the next node on a stem is called the internode. Label the node and internode on Figure 3. Above the node will be a bud called the axillary bud. Axillary buds are found at the base of leaves, but not leaflets in compound leaves. Label and color the axillary buds in Figure 3 yellow. When a leaf falls off a tree in fall, the process is called abscission. The petiole leaves a moon-shaped scar with small dots where the veins connected to the stem. This scar is known as the leaf scar and is used in winter identification of trees. Label and color the leaf scars red on Figure 3.

Leaves are modified in some plants to do certain jobs. In cactus, leaves are modified into spines or thorns for protection and to prevent water loss through transpiration. Some climbing plants have leaves modified into tendrils that can curl around surfaces and allow the plant to climb higher to reach more sunlight for photosynthesis. Label the modified leaves in Figure 4. Color the thorns orange and the tendrils blue.

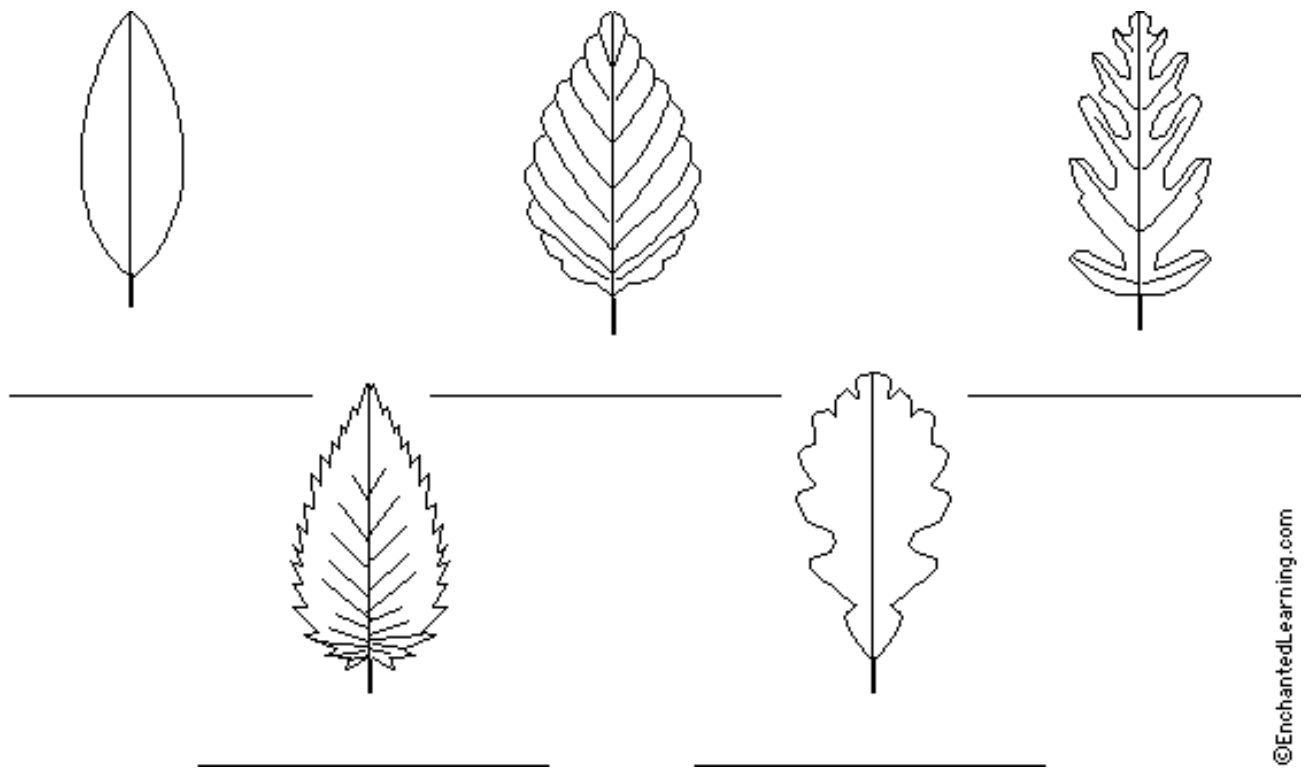
### **Questions:**

1. What is the stalk that joins the leaf to the stem called?
2. How does water vapor escape from a leaf? What is the process called?
3. Where would the greatest number of chloroplasts be found in a leaf?
4. What protects the surface of a plant from water loss?
5. Why are the air spaces between the spongy mesophyll cells important?
6. When water is lost from a plant, why does the plant look wilted?
7. What is the edge of a leaf called?
8. If the edge of the leaf appears toothed, what type of leaf edge is this?
9. The smaller veins in the leaf connect to the \_\_\_\_\_ of the leaf.
10. Leaves attach to a stem at a site called the \_\_\_\_\_.
11. A(n) \_\_\_\_\_ or scar appears at the base of the petiole where the petiole attaches to the stem.
12. Give 2 examples of modified leaves.

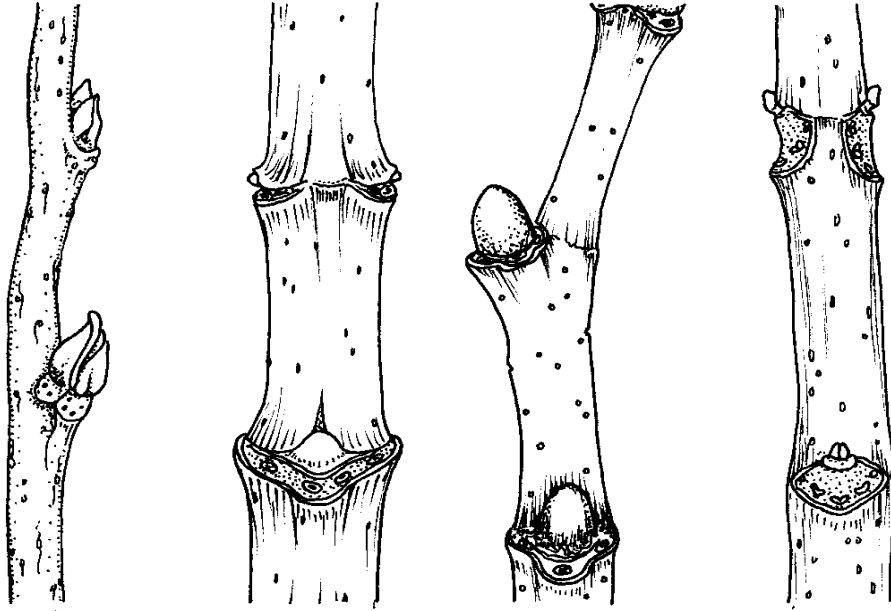
**Figure 1 - Parts of a Leaf**



**Figure 2 – Leaf Margins**



**Figure 3 – Twigs**



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**Figure 4 – Leaf Modifications**



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