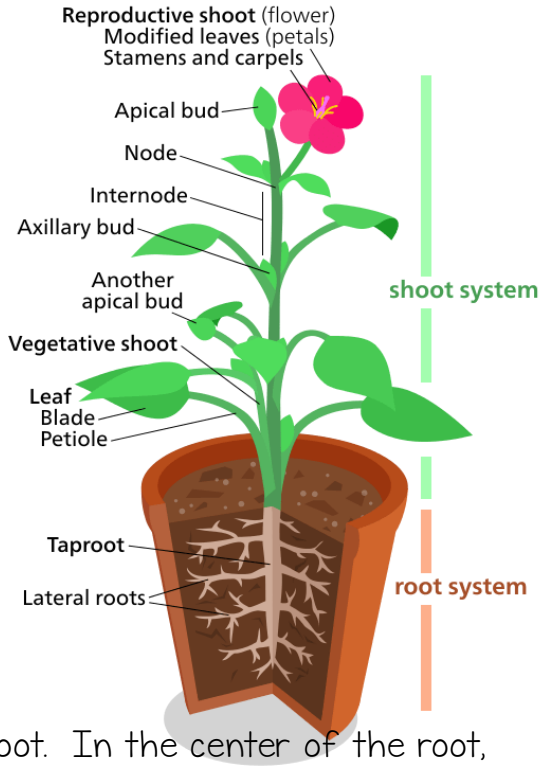
Plants

Section 5: Roots, Stems, and Leaves



A typical plant body consists of three primary organs: roots, stems, and leaves. Each carries out a specific function for a plant to develop. A **root** is the underground part of a plant and the organ that anchors a plant to the ground. A root absorbs water and minerals and contains vascular tissue to move them to the stem. All of the roots together form a root system. The outside layer of a root is called the epidermis, whose function is to protect and absorb. The surface of the epidermis is covered with root hairs which make holes in the spaces in the soil, allowing water and minerals to enter. The endodermis is a ground tissue layer that moves water and minerals to the center of the root. In the center of the root, the xylem and phloem make up the vascular cylinder. The root tip is covered by a root cap that protects the root. There are two main types of root systems called taproot and fibrous root. Carrots and beets are taproots which means they have a single, thick structure with smaller roots branching out. Grass has fibrous roots with small branching roots that grow from a central point.

The shoot system of a plant contains the stems and leaves. The **stem** produces leaves, branches, and flowers and provides the primary support of the plant by holding its leaves up to sunlight. It also carries substances between leaves and roots. Stems transport water and minerals from the root to the other parts of the plant. Stems have distinct **nodes** where the leaves attach. They also have **internodes** or regions between the nodes. Small **buds** or undeveloped plant tissue can be found where the leaves connect to the nodes.

Leaves capture the sun's energy and carry out the food-making process of photosynthesis. To collect sunlight, most leaves have thin, flattened sections called **blades**. The shape of the leaf maximizes the amount of light it can absorb. The blade is attached to the stem by a thin stalk called a **petiole**.

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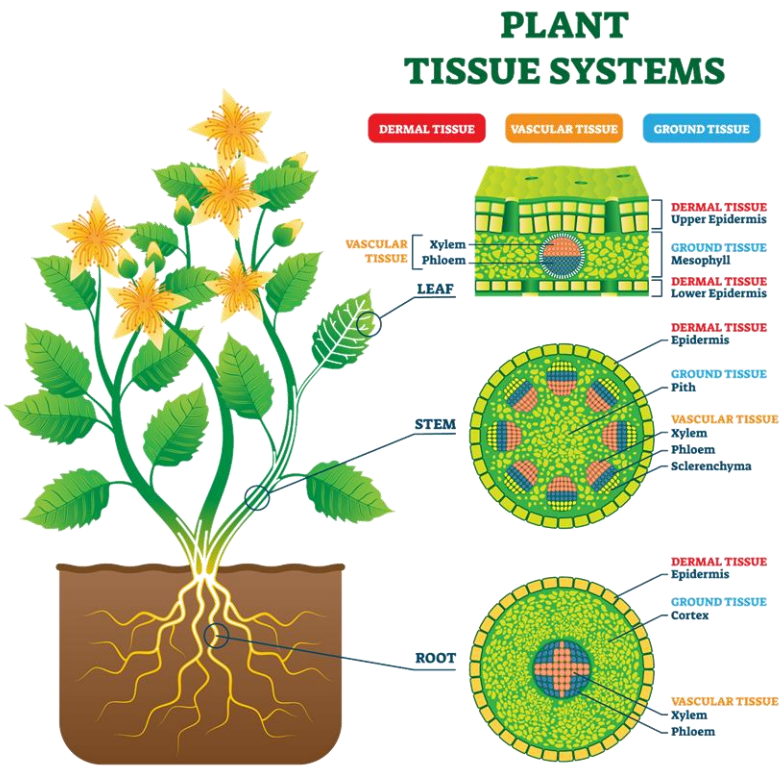
A waxy cuticle and **stomata**, or openings in the underside of a leaf, which allow carbon dioxide and oxygen exchange, help reduce water loss or **transpiration** from the plant leaves. Highly specialized cells called **guard cells** surround the stomata and regulate the movement of water vapor and carbon dioxide into and out of leaf tissues.

The structures within roots, stems, and leaves are made up of three tissue systems: **dermal**, **vascular**, and **ground tissue**. The **dermal tissue** system is the "skin" or an outer protective covering. The outer layer, called the epidermis, is covered with a cuticle that prevents water loss. The **vascular tissue** system is the "bloodstream" that provides support and transport. It supports the body and transports water and nutrients throughout a plant. The xylem and phloem cells are essential to this process. The **ground tissue** system consists of everything else, including photosynthesis and storage. The edible parts of plants, like asparagus, are ground tissue.



Review:

1. Identify the two types of root systems.
2. What is the function of the stem?
3. Describe the role of dermal tissue.