

Science Circuits: **READER STATION**

HOW ARE PLANTS CLASSIFIED?

Of the 1.6 million species of organisms identified by scientists, approximately 350,000 are plants! **Kingdom Plantae** is comprised of all plants that are autotrophic **producers**, meaning that they make their own food using energy from the sun through a process called **photosynthesis**. With the help of green **chloroplasts**, plants use carbon dioxide they take in through their leaves, water which they absorb through their roots, and energy from the sun and convert it into an oxygen byproduct and glucose sugar for food. Kingdom Plantae is divided into four main groups or divisions: non-vascular mosses and liverworts, vascular ferns that reproduce with spores, vascular gymnosperms or conifers that have needle-like leaves and cones, and vascular angiosperms which include flowering plants. Angiosperms make up the most dominant division.

Non-Vascular plants are low growing plants that get materials directly from their surroundings. They have small root-like structures called **rhizoids** which help them adhere to their substrate. They undergo asexual reproduction through vegetative propagation and sexual reproduction using spores. Examples include bryophytes like hornworts, liverworts, and mosses. A **moss** is a bryophyte and is considered to be one of the most primitive plants, being one of the first to develop the ability to live on land. They are non-vascular since they lack roots, stems, and leaves, and obtain water by osmosis rather than soaking it up through a root system.

Vascular plants have a system of tubes (roots, stems and leaves) to help them transport materials throughout the plant. Tubes called **xylem** move water from the roots to the stems and leaves. Tubes called **phloem** move food from the leaves (where sugar is made during photosynthesis) to the rest of the plant's cells. Vascular plants reproduce asexually through spores and vegetative propagation (small part of the plant breaks off and forms a new plant) and sexually through pollen (sperm) and ovules (eggs).

A **gymnosperm** is a vascular plant whose seeds are not enclosed in an ovule or fruit. The name means "naked seed" and the group typically refers to **conifers** that bear male and female cones, have needle-like leaves that are **evergreen**, or leaves that stay green year round and do not drop their leaves during the fall and winter. Examples include pine trees, ginkgos and cycads.

An **angiosperm** is a vascular plant whose mature seeds are enclosed in a fruit or ovule. These are **flowering plants** that reproduce using seeds, and are considered "perfect" and contain both male and female reproductive structures or "imperfect" and contain only male or female structures. Angiosperm trees are called **hardwoods** and they have broad leaves that change color and drop during the fall and winter. Flowers are divided into two parts, the male **stamen** made up of the anther and filament, and the female **pistil** which is composed of the stigma, style, and ovary.

Stigma: sticky part of the female reproductive organ that receives pollen during pollination.

Style: long tube that connects the stigma to the ovary. Pollen tube grows through it to fertilize the ovules.

Ovary with Ovules: contains and protects the ovules. When fertilized, the ovules develop into seeds which the ovary protects when it becomes a fruit.

Anther: Anthers are made of four pollen sacs which produce pollen grains via meiosis. When pollen grains are mature, the anthers split open and releases the grains to be carried by wind, water, pollinator, etc.

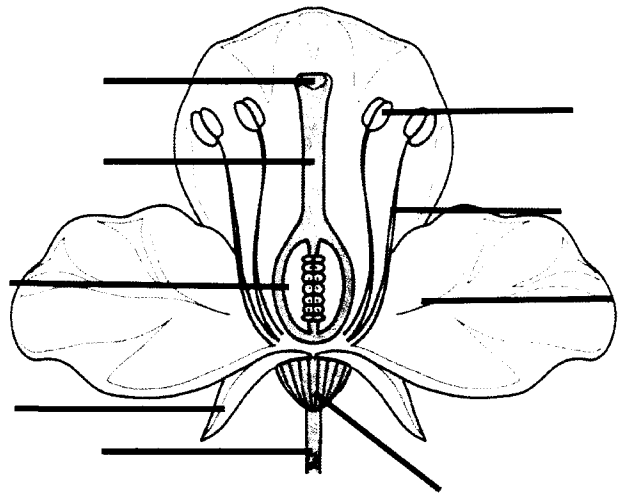
Filament: a thin stalk with supports the anther.

Petals: colorful flower structures which attract pollinators, act as a landing pad for the pollinators, and enclose the reproductive organs.

Sepals: the outer leaf-like part of the flower that encloses the developing bud for protection.

Receptacle: The end of the flower stalk to which all of the flower parts are attached.

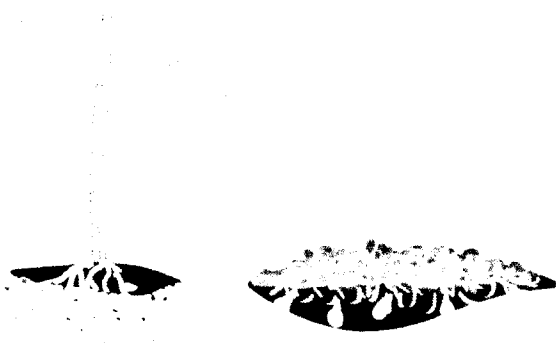
Stem: Supports the flower. If multiple flowers connect to one stem, it's called a pedicle or flower stalk.



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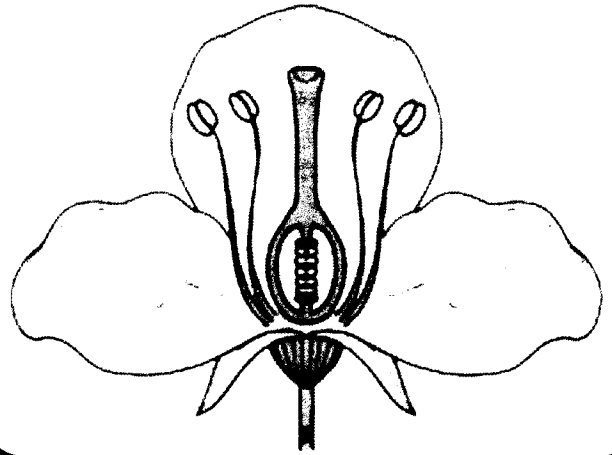
Compare and contrast vascular and non-vascular plants



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B

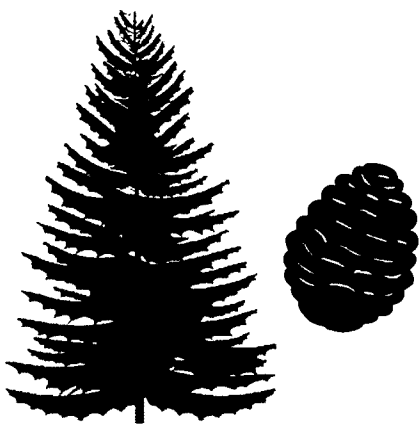
Describe the male and female parts of a flowering angiosperm.



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C

How is a gymnosperm similar to and different from an angiosperm?



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D

What are the characteristics of Kingdom Plantae?

