INTRODUCTION TO PLANTS

The Plant Kingdom

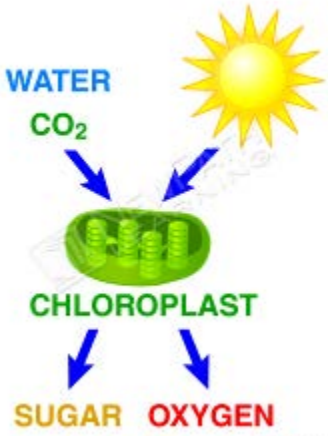
If you were to walk around a forest, what would you see? Most things that you would probably name are plants.

Plants are abundant in almost every environment that humans occupy. The species within the plant kingdom share two important characteristics.

Characteristics of All Plants

They are all eukaryotes, with numerous cells, and they are all autotrophs, use photosynthesis to make food.

Photosynthesis is a process powered by sunlight that uses carbon dioxide and water to produce oxygen and food.



We will learn more about photosynthesis in Topic 12.
The majority of plants live on land. This makes it difficult for plant species to complete a lot of functions because they are not surrounded by water.

How do plants survive on land?

In order fo e able to reproduce, r and nutrients f their bodies.

Reproduc
fertilizatio nd the egg cell m alled a **zygote**. For some plants, fertilization can only occur if water is present because the sperm swim through the water. Other plants have adapted to reproducing in a dry environment.

Transport materials around the plant: Food, water, wastes, and other materials need to be transported throughout the plant. All cells need food and water to survive. Food is made in the upper part of the plant and water and other materials are brought in at the base of the plant. Those materials need to be distributed throughout the plant. Plants have adapted to land by developing tissue. **Tissues** are similar cells that serve a specific function. Some plants have **vascular tissue** that transports materials throughout the plant. Vascular tissues consist of tube-like structures that transport water, food, and other materials inside the plant. Plants that have vascular tissue are known as vascular plants. Vascular plants are able to grow much taller because of this adaptation.

Obtain water and nutrients from the surroundings: Plants have adapted to living on land by having the ability to obtain water and other nutrients from the soil.

Retain water: Water evaporates when there is less water in the air than in the environment. Plants developed a structure that surrounds the leaves of most plant species called a cuticle. A **cuticle** is a waxy, waterproof layer that slows water evaporation.

Supporting the plant body: Plants require sunlight to make food. Different tissues within the plant give it support to reach high into the sky.

Plants Without Seeds

There are three types of seedless, vascular plants.
They are the fern, club mosses, and horsetails. They share the characteristics of being vascular and they reproduce using spores. These plants need a moist environment for reproduction because of the use of ater so that fertiliz

Today, the few species of

The Cha

Seed plant e seedless plants. The majority of the plants that we know are seed plants.

Seed plants have vascular tissue and reproduce using seeds.

Seed plants also have body plans that include roots, stems, and leaves.

There are two different types of vascular tissue within a vascular plant: phloem and xylem. **Phloem** moves food throughout the plant from the leaves to the rest of the plant. **Xylem** moves water and other nutrients from the roots to the rest of the plant.

Seed Structure

Seed plants have an advantage because they reproduce using seeds. **Seeds** have a protective covering that houses a young plant. Seed plants do not need water in order to reproduce. Seed plants deliver the sperm cells to the areas where the egg cells are located. After the fertilized egg, the zygote, the seed develops to protect the new plant

from drying out. Have you ever noticed that seeds from different plants look very different from one another?
Even with these differences, the actual structures of seeds are very similar.

There are three important parts to a seed: the seed coat, an embryo, and the stored food.

A new plar seed is called an e tages of growth.

An embryc s, and roots. For a time after the embryo is developed, the seed will stop growing. When it begins to grow again it uses stored food in a structure known as a cotyledon. A **cotyledon** is one or two seed leaf structures in the seed that store food within.

The outer protective cover of a seed is known as the **seed coat**.

The seed coat helps to keep the moisture inside of the seed so that it can survive a long period of time. In order for a seed to develop into a plant it needs sunlight, water, and other nutrients.

The next stage of a seed's life is germination. **Germination** is an early growth stage of an embryo. During this stage the roots begin to grow into the soil and the leaves and stem grow into the air.

Plant str

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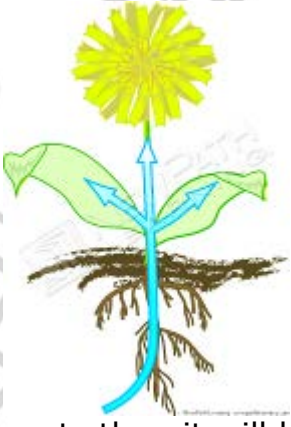
Roots: The roots anchor the plant in the ground and absorb water and other nutrients from the surrounding soil.



If a plant develops a lot of roots then it will have access to more water and other nutrients. Roots can also be used for storage. Some plants store food within the roots. Like in a potato, the portion that we consume is grown within the roots.

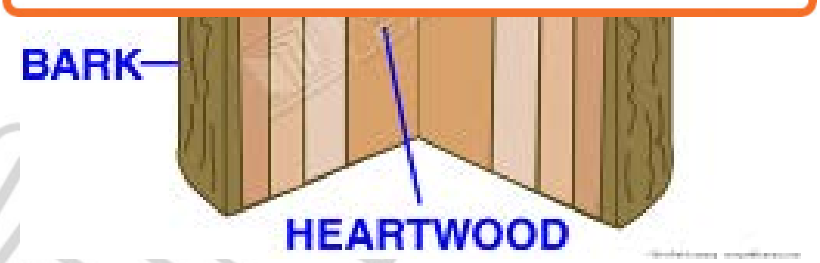
There are **two types of roots**, known as the taproot and the fibrous root. The root structure is comprised of vascular tissue, root hairs, and a root cap.

The vascular tissues, the xylem and phloem, transport materials throughout the plant. The root hairs help absorb water and other nutrients and also help to anchor the plant.

Root caps are dead cells that act like a helmet for the root by blocking against damage from rocks as it grows through the soil.

Stem: The stem supports the plant and carries materials to the cells, roots, or leaves. There are two types of stem: herbaceous and woody. Herbaceous stems are soft and woody stems are tough and rigid.

Woody stems have an outer layer called **bark** that helps to protect the cells inside the stem. The **phloem** cells are inside the bark. Inside of the phloem is a layer of cells known as the **cambium**.



The **cambium** divide to produce both xylem and phloem cells. Inside the cambium is the active xylem (sapwood). Inside of the active xylem is the inactive xylem (heartwood). The rings of a tree are made by the xylem. Scientist can determine the age of a tree by looking at the rings of a tree.

Lesson Checkpoint:

Which type of stem has bark and cambium?

Leaves: Leaves capture light energy from the sun to produce food and oxygen in a process known as photosynthesis.

If we sliced a leaf and placed it under a microscope, we would see many different structures. The skin and cuticle protect the cells within. The veins contain the xylem and phloem. The base of the leaf contains structures called stomata. **Stomata** are openings that control when gases come into and are let out of the leaf.

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Gymnosperms and angiosperms

A **gymnosperm** is a seed plant that develops seeds that do not have a protective outer covering, or naked seed.

Most gymnosperms are trees and all have naked seeds. The leaves of gymnosperms are needle or scale-like and they have deep growing root systems. The majority of gymnosperms have a reproductive structure that is known as a **cone**. A tree will generally produce both male and female cones, but there are trees that will produce one or the other or even none at all.

The male cones produce pollen, which are cells that will form sperm cells. Reproduction occurs when the pollen gets onto the female cone. Over time the sperm and cell will join together in a structure called the ovule. An **ovule** contains an egg cell. After fertilization takes place the zygote will develop into the embryo portion of the seed.

Lesson Checkpoint: What is the function of the cone in gymnosperms?

An **angiosperm** is a plant that produces seeds that are within a fruit. That structure where seeds develop is called the **ovary**. The ovary is located within the flower of an angiosperm. The flower is the reproductive structure of an angiosperm.

Angiosperms are grouped together because they all produce fruits and flowers. Flowers are different according to the species of angiosperm, but they generally have typical features.

Structure

The petal i... The sepal is a leaf-lik...ns. Flowers ha...male reproducti...her and filament. ...n consist of the stig...

Reproduction begins when the pollen from the anther gets on to the stigma. Eventually the egg will be fertilized in the ovule that is in the ovary and turn from a zygote to a embryo inside a seed. There are certain species that help plants in the process of pollination. When an organism feeds on the nectar of a flower it picks up pollen from the anther. It will soon feed on another flower of the same species and the pollen will get onto the stigma of the second flower.

When the seed develops the ovary will begin to turn into a fruit. A **fruit** is an ovary that has ripened and holds the seeds of the plant. Animals will eat the fruit and disperse the seeds away from the parent.

Types of Gymnosperms

Gymnosperms first appeared on earth about 360 million years ago, which makes them the oldest seed plants. There are four different groups of gymnosperms: **cycads, ginkgo, gnetophytes, and the conifers.** Cycads look similar to palm trees and inhabit areas that are tropical. There is only one species of ginkgoes left on earth.

Gnetophytes are the least common of the gymnosperms. They live in a desert climate in remote areas.

Conifers are plants that have cones. This is the largest and most diverse group of gymnosperms. Many of the species are called evergreens because they keep their leaves/needles year round.

Types of Angiosperms

There are two major groups of angiosperms called **monocots and dicots.** Th s one and di means t e grasses, tulips, and

They norm le of three peta e oak trees, rose e flower petals or a