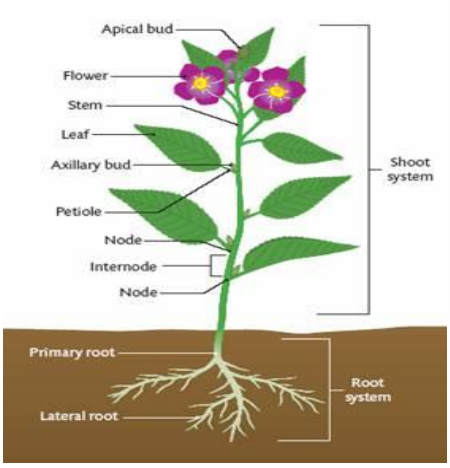
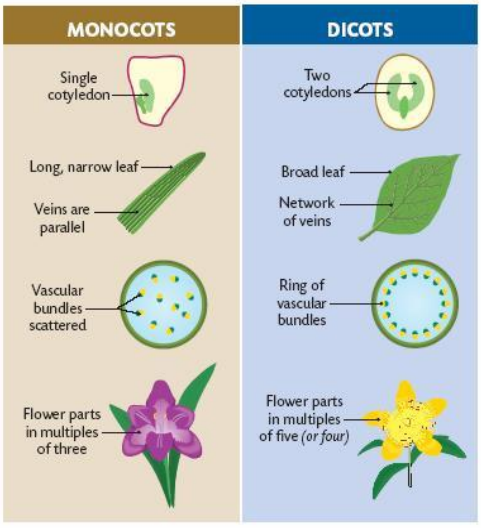
Plant Structure | Topic Notes

A cotyledon is an embryonic seed leaf.

- Types of tissue in **angiosperms** (flowering plants):
    1. **Dermal (or epidermal):** this is the outer covering of the plant. As well as providing protection, in the roots it's specialised to absorb water &minerals from the soil while in the leaves it secretes a waxy cuticle to prevent loss of water.
    2. **Ground:** makes up the bulk of a plant, providing support, photosynthesis and storage for water and food.
    3. **Vascular:** involves **xylem tissue** (transports water and minerals up the plant), and **phloem tissue** (transports food up and down the plant).
- The **meristem** is composed of unspecialised cells that are continuously dividing by mitosis. (*It develops into each of the three tissue types*).
- The functions of a shoot system include **photosynthesis**, **reproduction** (sexual & asexual), **storage of food**, **gas exchange** and**transport.**

Parts of the flowering plant: ***differences between monocots &dicots:***



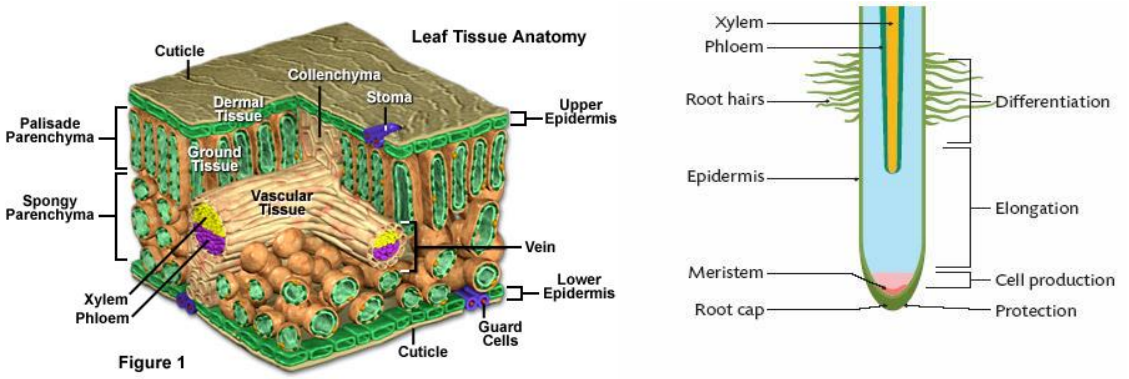


- Stems of monocots are usually **herbacaeous**, meaning they're green in colour and capable of photosynthesis.
- **Lenticles**are small pores on a stem that function in gas exchange.
- In the center of a stem the ground tissue is called the **pith**, whereas the outer region is called the **cortex.**
- **Chlorophyll** is a green pigment that captures the energy in sunlight to make food in the process of photosynthesis.

- The leaf functions in photosynthesis and **transpiration** (the loss of water from the leaf)
- The edge of a leaf is called the **leaf blade** or **lamina**. The leaf is attached to the stem or branches by a **leaf stalk** or **petiole**.
- There are two types of venation in plants. Most monocots (e.g. grasses) have **parallel venation**. Most dicots (e.g. buttercups) have **reticulate or net venation**, they have a **midrib** and **veins** that branch out from it.
- On the underside of a leaf are thousands of tiny *apertures* (small openings) called **stomata** (singular *stoma*) that allow gas exchange. **Guard cells** control when to open them.(*O_2 is released during daytime, CO_2 is released at night*)
- Epidermal cells on the leaf secrete a **waxy cuticle** to assist in the control of **transpiration**.

N.B *xylem is always on the inside when drawing a ts/cs sketch of a plant stem. Phloem is always on the bottom of a ts/cs sketch of a leaf.*

Tranverse section of root tip:



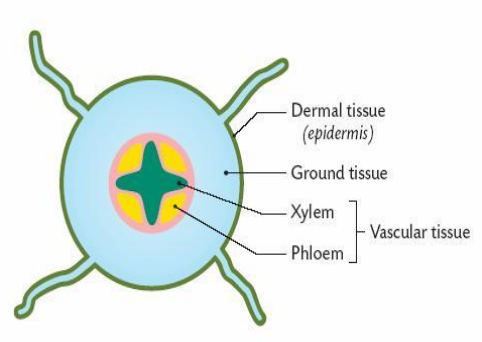
- **Monocots** have flower parts arranged in **multiples of three**. **Dicots** are arranged in multiples of **four or five**.
- **A bud** is an undeveloped shoot. (they contain meristematic tissue). There are three types of bud:
    1. **Axillary buds:** are present at the axil of a leaf and can develop into a branch/leaf/flower.
    2. **Apical buds:** are present at the tip of a plant/branch and become a branch/leaf/flower.
    3. **Adventitious buds:**can be present anywhere on a plant. Pruning stimulates growth.
- **Roots** function in **anchorage, absorption, transportation, storage** and **support**. They may be:
    1. **Tap root systems:** the first root is the main root with many smaller ones.(e.g. carrot)
    2. **Fibrous root systems:** young root withers and many new ones emerge. (e.g. grass)
    3. **Adventitatious root systems:**emerge from anywhere on stem/branches.(e.g. ivy)

    All roots have the same general structure consisting of four separate zones:
    1. **Zone of protection:**consists of a root cap protecting the meristematic tissue.
    2. **Meristematic zone:**consists of meristem tissue undergoing rapid cell division (mitosis).
    3. **Zone of elongation:**newly produced cells increase in size.

4. **Zone of differentiation:** cells specialise by becoming ground, epidermal, xylem and phloem tissue cells.

- **xylem vessels** are **continous tubes** with **pits** that enable water movement between different vessels.
- **Xylem tracheads** have **tapered ends** and are connected to other tracheids by **pits** in their side walls.
- **Phloem** is considered a living tissue because of its **companion cells** that control it.

Tranverse section of a root:



differences between xylem and phloem:

	Xylem	Phloem
Made of	Dead cells	Living cells
Cell wall thickness	Thick	Thin
Cell wall material	Lignin (rigid)	Cellulose
Permeability	Impermeable	Permeable
Cytoplasm?	None	Cytoplasm lining
Transports…	Water & minerals	Food
Carried to…	Leaves	Growing parts & storage organs
Direction of flow	Upwards	Up and down
Tissue also has…	Fibres	Companion cells

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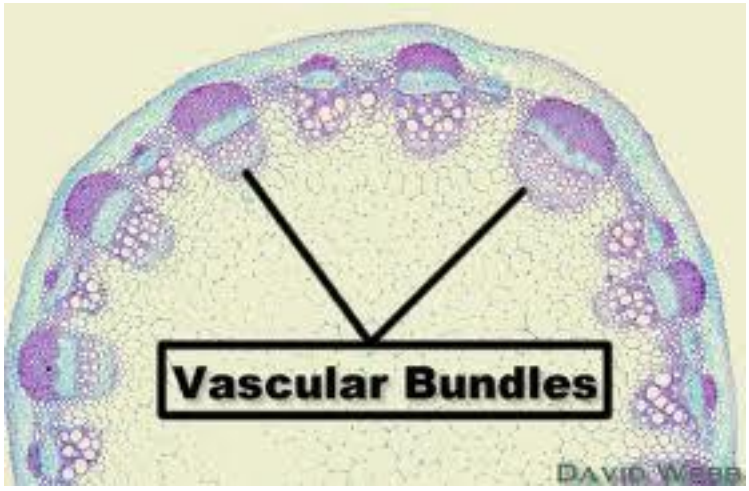
Plant Structure Experiments

To prepare and examine a transverse section of a dicot stem.

Busy Lizzy, Bengonia or Sunflowers.

1. Cut out a short section of the stem between 2 nodes using a backed blade.
2. Wet the blade *to reduce friction* and cut thin sections of the stem *cut away to prevent injury.* Cut at right angles to the stem and avoid wedge shaped specimen. **or** place into a slit that is cut in some elder pit.

to



3. Store cut sections in a clock glass or petri dish of water *prevent dehydration.*

4. Transfer a thin section onto a microscope slide using a paint brush or forceps. Add a drop of water and lower coverslip onto the specimen at an angle *to prevent air bubbles obscuring the view.*

5. Optional to stain with iodine, always use lowest objective lens first.