

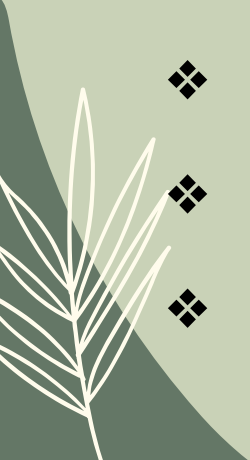



Plant System

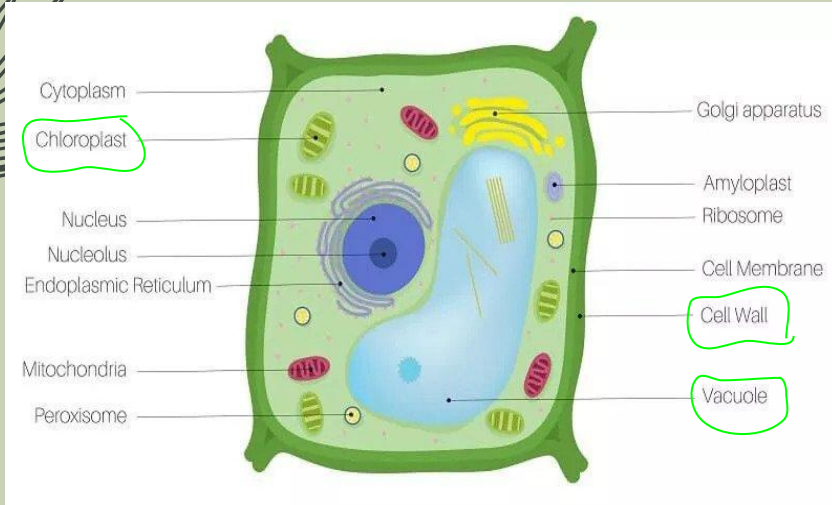
Jordan Cortez & Akila Iguchi



Content Standard

- ❖ Understand the functions of the different cells, tissues, and organs of a plant
 - ❖ Understand the 2 types of plant growth
 - ❖ Understand the life cycle of a flowering plant
 - ❖ Understand plant nutrition and nutrient transport
 - ❖ Understand the functions of plant hormones
 - ❖ Understand plant tropisms and photoperiodism
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Plant Cell Structure



Unique Structures

❖ Cell Wall

- Provides a structural framework to support plant growth
- First line of defense for pathogens

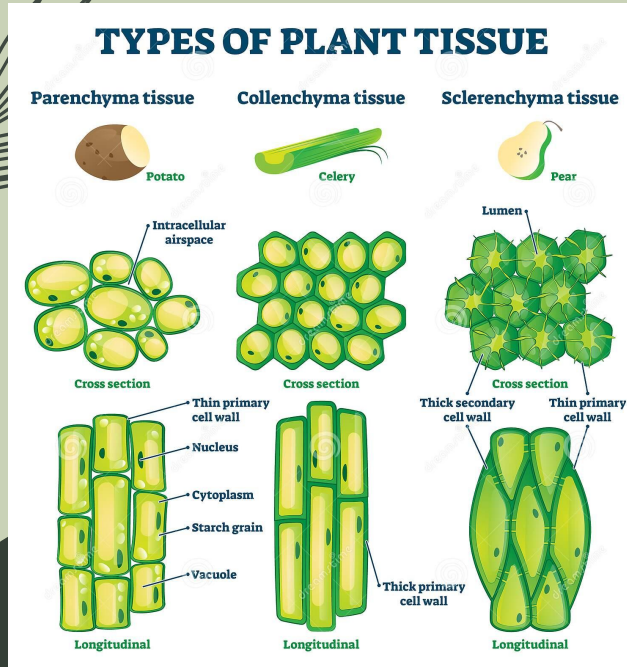
❖ Chloroplast

- Site of photosynthesis

❖ Central Vacuole

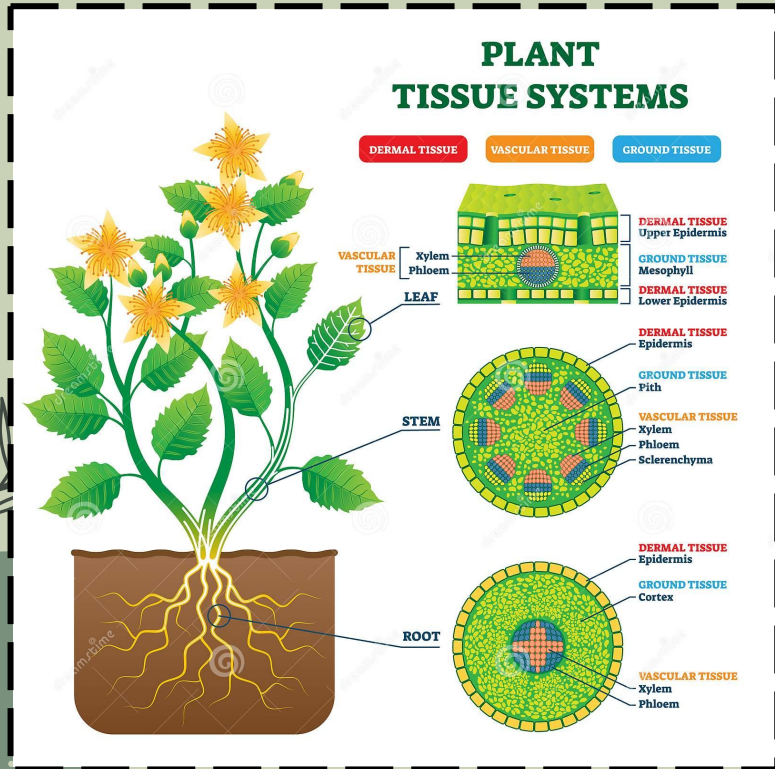
- Stores water & maintains the cell's firmness

Plant Cell Types



- ❖ Parenchyma Cells - Has primary thin walls; functions as food storage & photosynthesis; can divide and differentiate into other types of cells which allows repair
- ❖ Collenchyma Cells - Provides support with plant growth, stems of plant leaves, and flexibility in the petiole
- ❖ Sclerenchyma Cells - Structural support for plant organs; cells are dead when mature and provide structural support

Plant tissue systems



Xylem Tissue: Transports water and minerals and dissolved minerals from roots to the stem and leaves

Phloem Tissue: Transports sugars from leaves/ storage tissue to other areas of the plant

Ground System:

- Bulk of plant tissue
- Functions: Photosynthesis, storage, & plant support

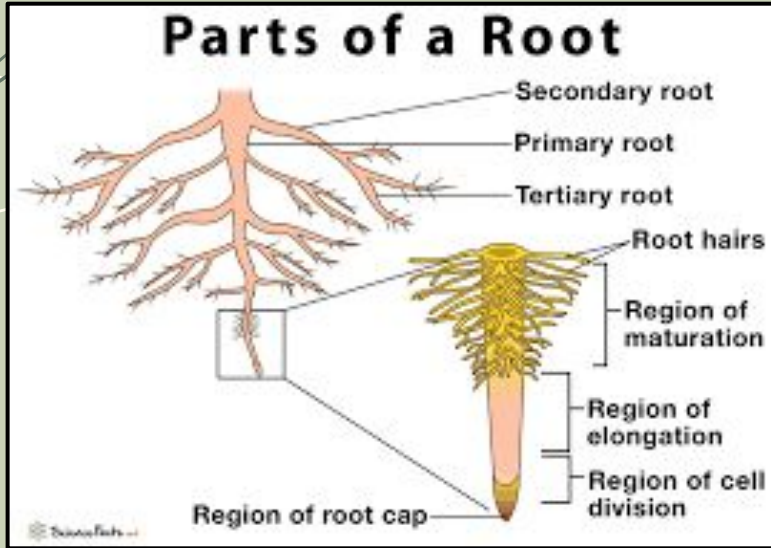
Vascular System:

- Provides support and long-distance transportation
- Includes Xylem & Phloem

Dermal System:

- Epidermis ("skin" of plant)
- Single layer of tightly packed cells that covers/protects plant

Root System



❖ Roots

- Anchor the plant in the soil
- Absorb and transport minerals and water
- Store food

❖ Root Hairs

- Located near the root tips
- Increase the root surface area
- Provide an extensive outer layer for absorption

Shoot System

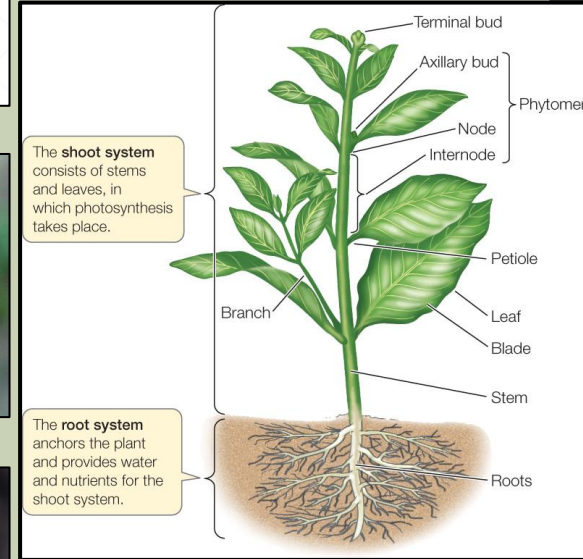
❖ Stems:

- Grow above ground and support leaves/flowers
- When a stem is growing in length, the terminal bud, has developing leaves and a compact series of nodes and internodes
- Axillary buds are the embryonic shoots in each of the angles formed by a leaf and the stem



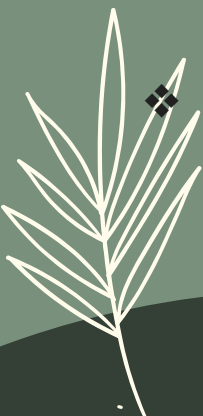
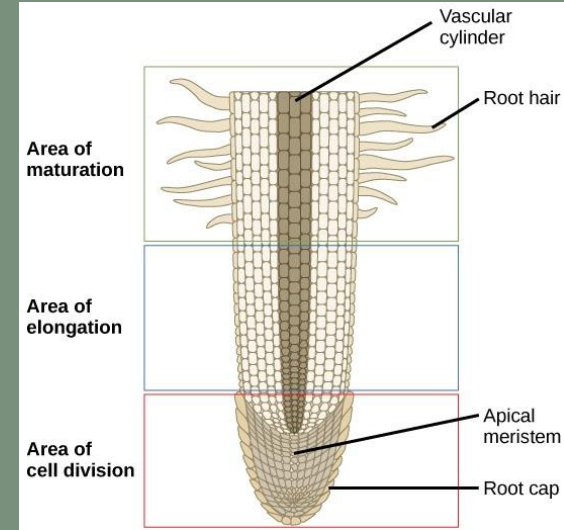
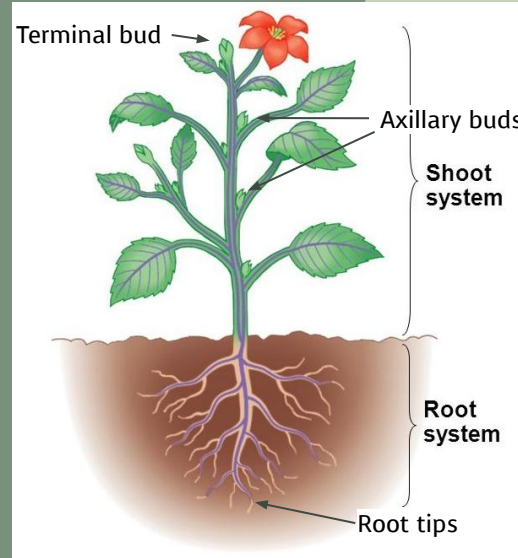
❖ Leaves:

- The primary sites of photosynthesis
- Consists of a flattened blade and a stalk
- Come in different arrangements (simple, compound, and doubly compound)



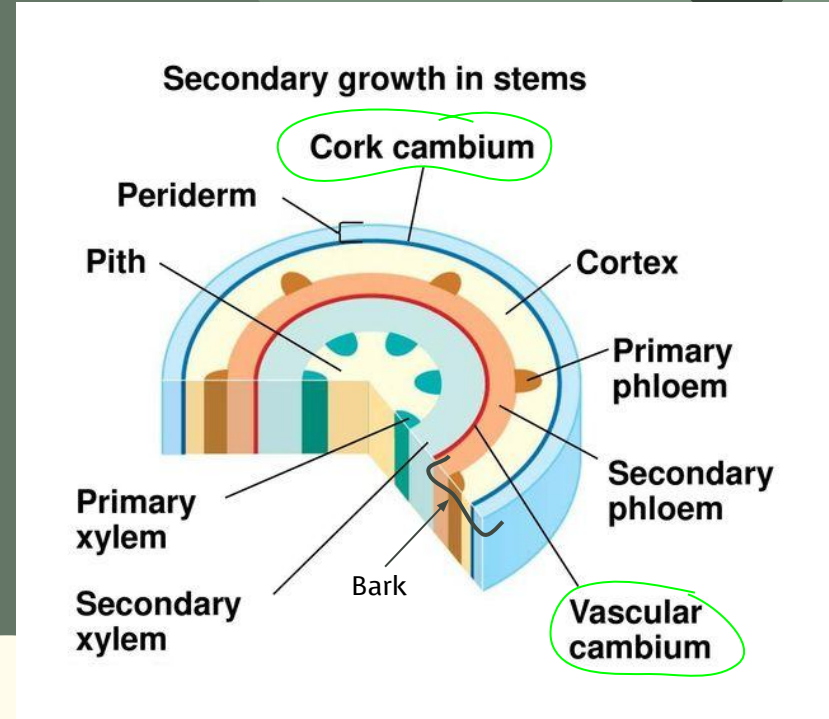
Primary Growth: Lengthening

- ❖ Meristems - Tissue that divide frequently, causing plant growth
- ❖ Apical Meristems - Meristems at the tip of roots, & in the terminal & axillary buds
- ❖ Root Cap - Protects apical meristems in roots



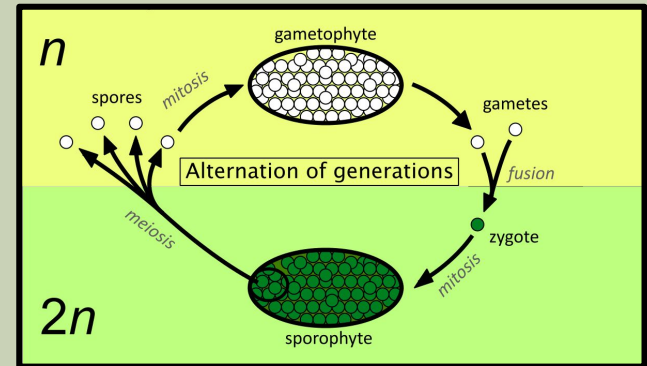
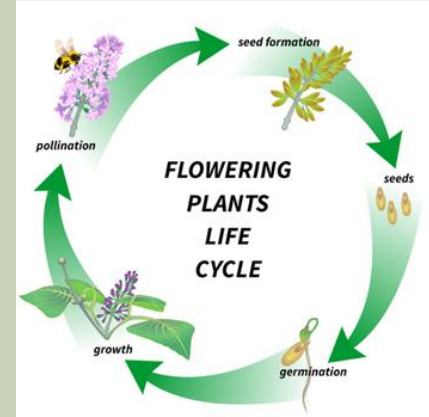
Secondary Growth: Thickening

- ❖ Cell division occurs in two meristems
 - Vascular Cambium - Cylinder of actively dividing cells between the primary xylem and primary phloem
 - Cork Cambium - Produces cork, the outermost layer
 - Bark - Everything external to the vascular cambium



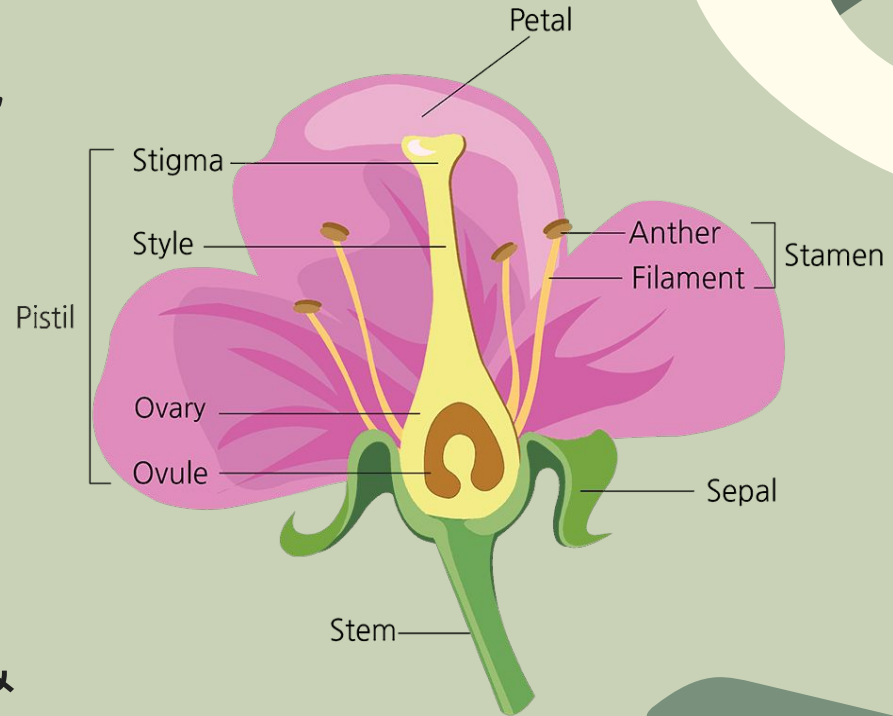
Life Cycle of a Flowering Plant

- ❖ Reproduction
 - Asexual Reproduction
 - Sexual Reproduction - Fertilization
- ❖ Plant life cycles alternate between haploid and diploid generations
 - Gametophyte - Haploid plant body
 - Sporophyte - Diploid plant body



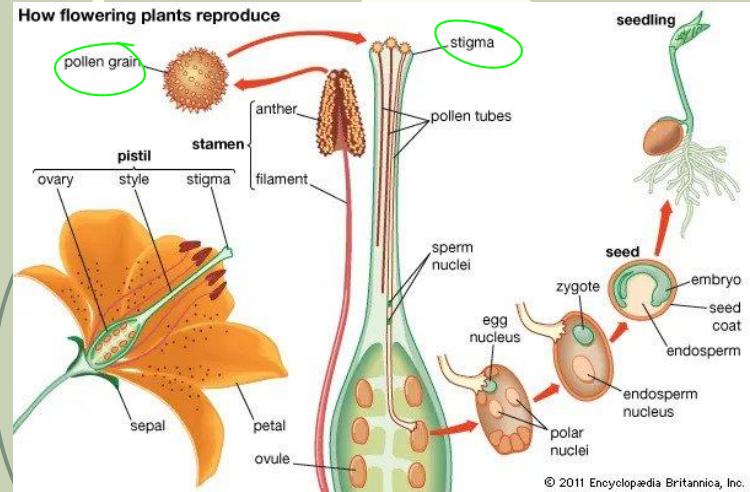
The Flower

- ❖ Structure specific to sexual reproduction for angiosperms, plants that flower and produce fruits
 - Sepals - Enclose & protect flower bud
 - Stamen - Includes anther, where pollen grains are produced
 - Carpel - Contains stigma & ovary



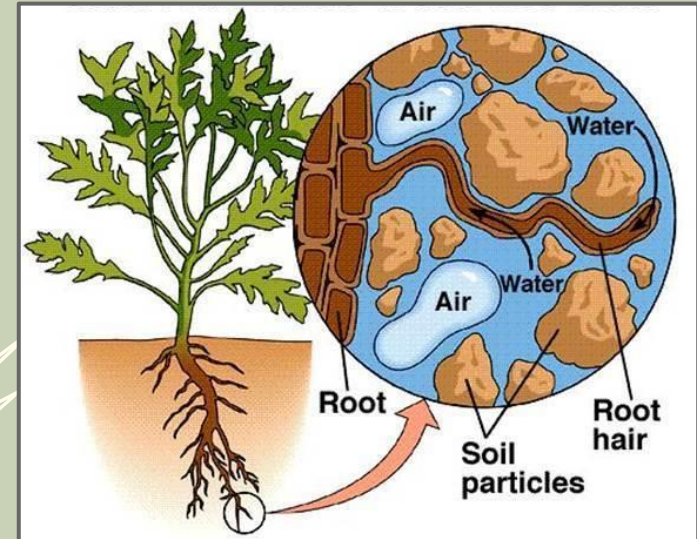
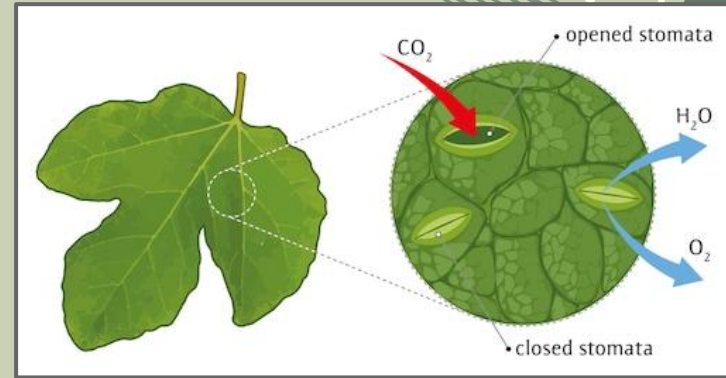
Pollination and Fertilization

- ❖ Gametes produced from gametophytes
 - Pollen grain - Male gametophyte
 - Embryo sac - Female gametophyte
- ❖ Pollination - Delivery of pollen grain to stigma
 - Two haploid sperms released, discharged into ovule of haploid egg cell
 - Double fertilization - Fertilized egg becomes haploid zygote and endosperm
 - Endosperm - Food-storing tissue



Nutrition absorption

- ❖ Gas absorption - Absorbs CO₂ from the stomata
 - Stomata - (shoot system) Small openings on the epidermis of leaves that facilitate gas exchange
- ❖ Water/Mineral absorption - (root system) Root absorbs water through osmosis, absorbs minerals through active transport from a carrier protein
 - Root hairs increase surface area for absorption to occur



Water/Mineral transportation

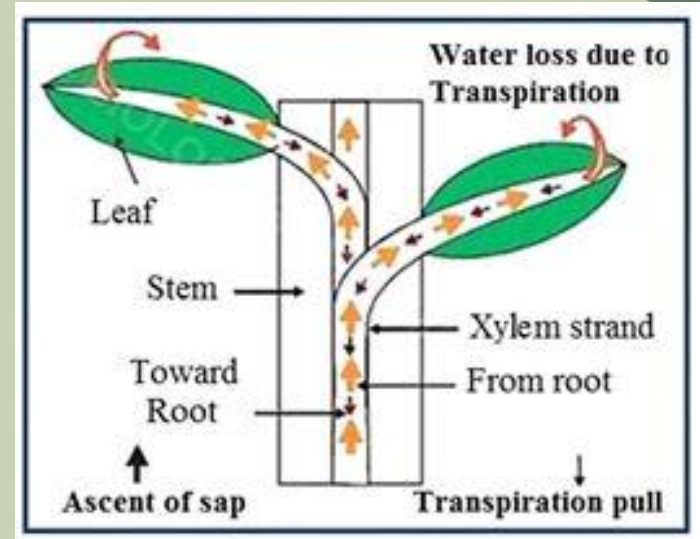
❖ Xylem sap - Mixture of water & minerals

❖ Transpiration-cohesion-tension mechanism - Xylem sap transported up the plant

➤ Transpiration - Loss of water from leaves via evaporation

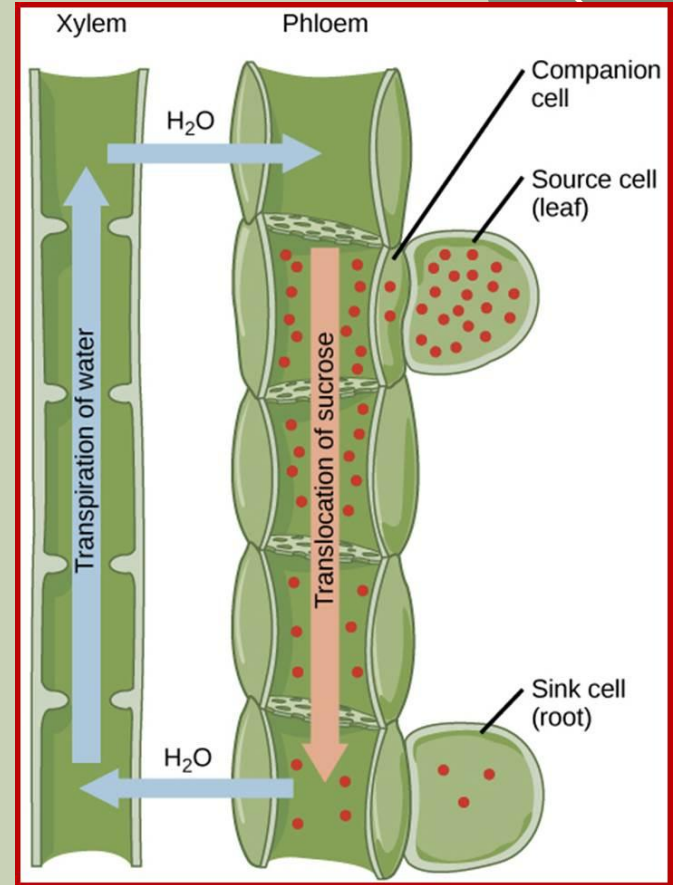
➤ Cohesion - Molecules sticking together

➤ Adhesion - Different Molecules sticking together



Sugar transportation

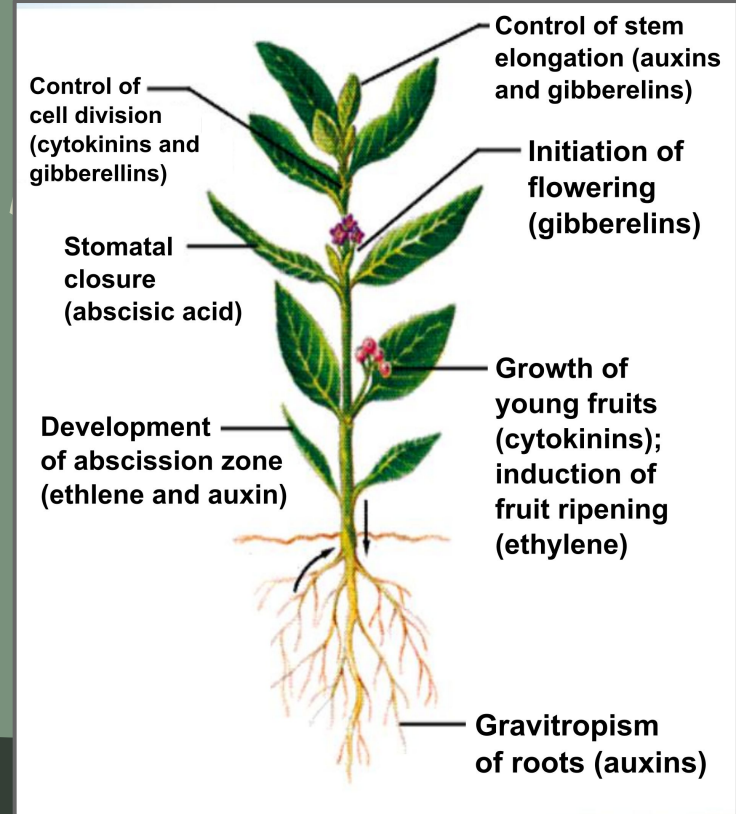
- ❖ Phloem sap - Sugary solution
- ❖ Pressure-flow mechanism - Transports phloem sap
 - Sugar loaded into phloem tube from the source cell
 - High solute concentration in phloem tube, brings water in from xylem tube by osmosis, raising the pressure
 - At the sink cell, sugar flows out of phloem tube, lowering the solute concentration, and lowering the pressure
 - Water flows back into the xylem tube, and the cycle repeats



Plant hormones

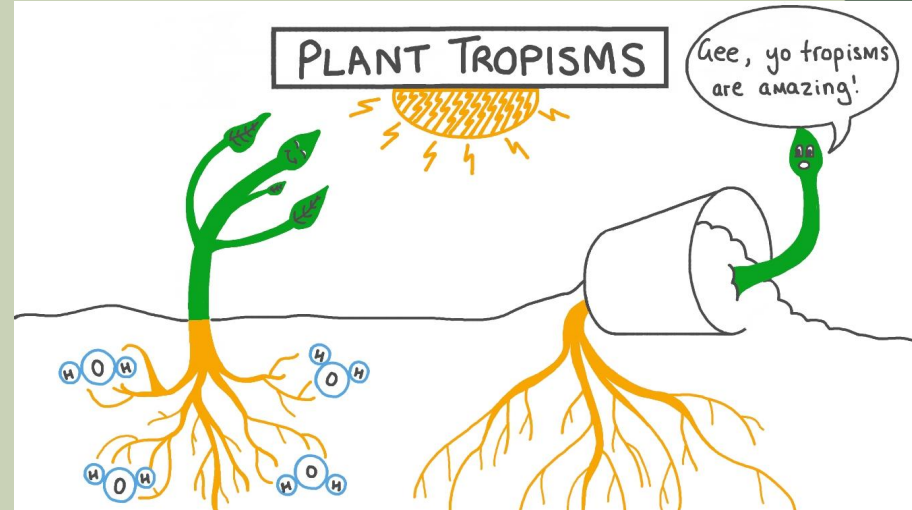
❖ 5 main hormones:

- Auxins - Cell elongation
- Ethylene - Fruit ripening
- Cytokinins - Cell division
- Gibberellins - Seed germination, fruit ripening
- Abscissic acid - Inhibits growth



Tropisms

- ❖ Growth responses that cause parts of a plant to grow toward or away from a stimulus
 - Phototropism - Light
 - Thigmotropism - Touch
 - Gravitropism - Gravity



Photoperiodism

- ❖ Used to detect the time of year by the relative lengths of day & night
 - Long-night plants - Flowers after a set period of dark
 - Short-night plants - Flowers if night length is shorter than a set length

