*This is the **Foundation Separate** version — Higher Tier content has been removed.*

Plants have their own tissues and transport systems. Understanding their structure explains how plants survive and grow.

- Epidermis: outer protective layer of leaves. Often covered in a waxy cuticle to reduce water loss.
- Palisade mesophyll: column-shaped cells packed with chloroplasts. Located near top of leaf. Main site of photosynthesis.
- Spongy mesophyll: irregularly arranged cells with large air spaces. Allows CO■ to diffuse to palisade cells.
- Stomata: pores in the lower epidermis (mainly) that allow gas exchange (CO■ in, O■ and water vapour out). Controlled by guard cells.
- Guard cells: become turgid (in light/water-rich conditions) → open stomata. Become flaccid (in drought/dark) → close stomata.
- Xylem vessels: dead hollow cells with lignified walls. Transport water and minerals from roots to leaves (transpiration stream). One-way flow.
- Phloem: living cells with sieve plates. Transport dissolved sugars (sucrose) from leaves (source) to all parts of plant (translocation). Bidirectional.
- Root hair cells: long extensions, large surface area. Absorb water by osmosis, mineral ions by active transport.

Key Terms

Transpiration	Evaporation of water vapour from leaf cells through stomata — driven by concentration gradient
Translocation	Movement of dissolved sugars (sucrose) in phloem from leaves to rest of plant
Xylem	Dead hollow vessels carrying water and minerals upwards from roots — lignified walls
Phloem	Living cells transporting dissolved sugars throughout the plant — bidirectional
Guard cells	Cells surrounding stomata — control opening and closing to regulate gas exchange and water loss

■ **Exam Tip:** Know the difference between TRANSPIRATION (water in xylem, upward) and TRANSLOCATION (sucrose in phloem, any direction). These are often confused in exams.