*This is the **Higher Separate** version — includes all Higher Tier content (marked ★) and all Separate Science content.*

Plants use xylem and phloem to transport water, minerals and sugars throughout their tissues.

Required Practical: Investigating transpiration rate using a potometer at different temperatures, humidities or wind speeds.

- Xylem: dead hollow cells, lignified walls, transports water and minerals UPWARD from roots (transpiration stream)
- Phloem: living cells with sieve plates, transports dissolved sugars (translocation), bidirectional
- Transpiration: evaporation of water from leaves through stomata. Pulls water up xylem.
- Rate increases with: higher temperature, more light, lower humidity, more wind
- Root hair cells: water absorbed by osmosis; mineral ions by active transport
- Guard cells: turgid = stomata open; flaccid = stomata close

Key Terms

Transpiration	Evaporation of water from leaves through stomata — drives water up xylem
Translocation	Transport of sucrose through phloem — can be in any direction
Xylem	Dead vessels transporting water and minerals upward
Phloem	Living cells transporting dissolved sugars in any direction

■ **Exam Tip:** TRANSPIRATION = water in xylem going UP. TRANSLOCATION = sucrose in phloem in any direction. Common mistake: confusing the two.