

7 Transport in plants – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	Write it 3 times (English)		
xylem	_____	_____	_____
phloem	_____	_____	_____
Transpiration	_____	_____	_____
evaporates	_____	_____	_____
diffuses	_____	_____	_____
stomata	_____	_____	_____
hydrogen bonds	_____	_____	_____
cohesion	_____	_____	_____
tension	_____	_____	_____
xerophyte	_____	_____	_____
adapted	_____	_____	_____
cuticle	_____	_____	_____
Translocation	_____	_____	_____
sucrose	_____	_____	_____
source	_____	_____	_____

English**Write it 3 times** (English)

sink

active transport

water potential

pressure

mass flow

Recall

From Part 1 you know **xylem** carries water up and **phloem** carries food. Here we see what pulls the water up and how the food is moved.

- Leaves lose water vapour – you saw this at IGCSE.
- Water molecules stick together, which turns out to be very important.

New ideas

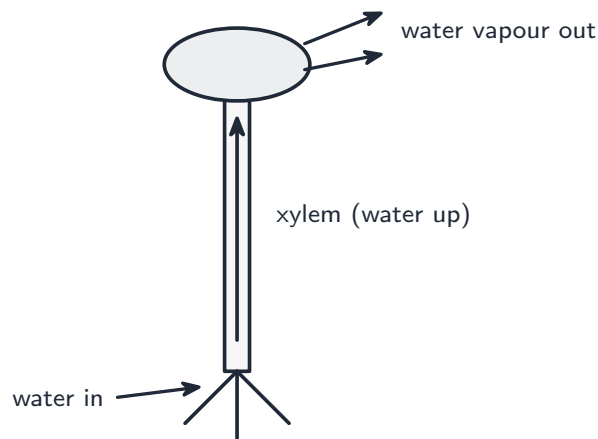
Read these first, then do the Practice.

■ 1 Transpiration

Transpiration is the loss of water vapour from a plant. Water **evaporates** from wet cell surfaces inside the leaf, then **diffuses** out through the **stomata**.

This loss at the top pulls a continuous column of water **up** the xylem:

- water molecules attract each other by **hydrogen bonds**, so they stick together – this is **cohesion**.
- the whole column is pulled up under **tension** (the cohesion–tension idea).



■ 2 Xerophytes

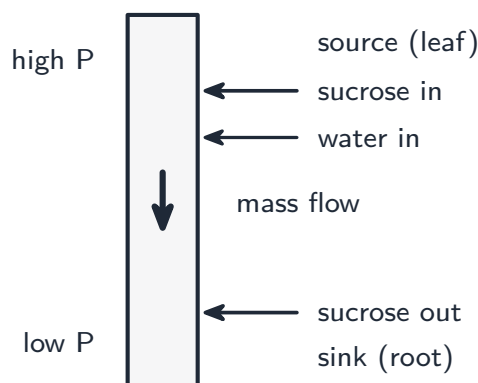
A **xerophyte** is a plant **adapted** to dry places. Its leaves cut water loss with a thick waxy **cuticle**, **stomata** sunk in pits, hairs that trap moist air, and leaves that can roll up.

■ 3 Translocation (moving sugars)

Translocation carries sugars (**sucrose**) in the phloem from a **source** to a **sink**:

- a **source** is where sugar is made or released (e.g. a leaf).
- a **sink** is where it is used or stored (e.g. a growing root).

Companion cells load sucrose into the sieve tube by **active transport**. This lowers the **water potential**, so water enters and raises the **pressure**. Sap then flows from high pressure (source) to low pressure (sink) – this is **mass flow**.



Watch out: transpiration *pulls* water up the xylem by cohesion–tension (no energy used). Translocation in the phloem *actively* loads sugars and moves them source → sink by mass flow (this *does* use energy).

Practice

Try these in order.

7.1 Define transpiration. [1]

7.2 Describe how water vapour leaves a leaf, using the words *evaporate*, *stomata* and *diffuse*. [2]

7.3 Water molecules stick together as they move up the xylem. (a) Name this sticking together. (b) Name the force that holds the molecules together. [2]

7.4 State two ways a xerophyte leaf reduces water loss. [2]

7.5 In translocation, explain the difference between a *source* and a *sink*. [2]

7.6 Loading sucrose into a sieve tube causes water to enter it. Explain why. [2]

7.7 Challenge. Water rises to the top of a tall tree with no pump. Explain how transpiration and cohesion make this possible. [2]
