

7 Transport in plants – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	Write it 3 times (English)		
osmosis	_____	_____	_____
tissues	_____	_____	_____
xylem	_____	_____	_____
mineral ions	_____	_____	_____
phloem	_____	_____	_____
vessel	_____	_____	_____
lignin	_____	_____	_____
sieve tube	_____	_____	_____
sieve plates	_____	_____	_____
companion cell	_____	_____	_____
root hair cell	_____	_____	_____
apoplast pathway	_____	_____	_____
cell walls	_____	_____	_____
symplast pathway	_____	_____	_____
cytoplasm	_____	_____	_____

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

endodermis

Casparian strip

Recall

At IGCSE you learned that plants take up water through their roots and that leaves lose water. Now we look at the two transport tissues and how water reaches them.

- Plants have tubes that carry water and food, a bit like our blood vessels.
- Water enters the root by **osmosis** (from the Cell membranes sheet).

Nothing here is harder than IGCSE – it just adds the right words.

New ideas

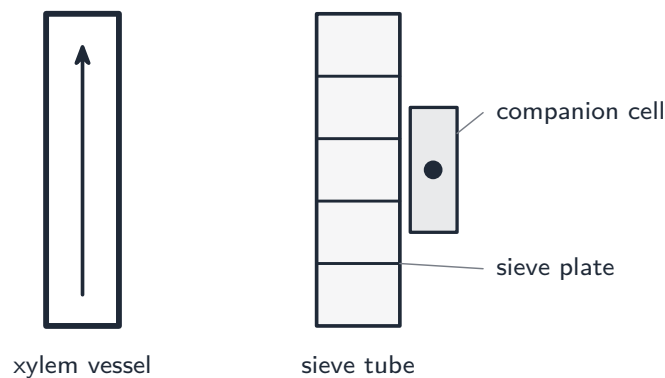
Read these first, then do the Practice.

■ 1 The two transport tissues

Plants move substances through two **tissues** :

- **xylem** carries **water** and dissolved **mineral ions** **up** from the roots.
- **phloem** carries dissolved food (mainly sugars) to wherever it is needed.

Tissue	Structure	Suits its job because...
xylem vessel	dead, empty cells joined end to end; walls strengthened with lignin	a hollow open pipe lets water flow fast; lignin gives support
phloem sieve tube	living cells with sieve plates ; a companion cell alongside	the companion cell does the living work and loads sugars

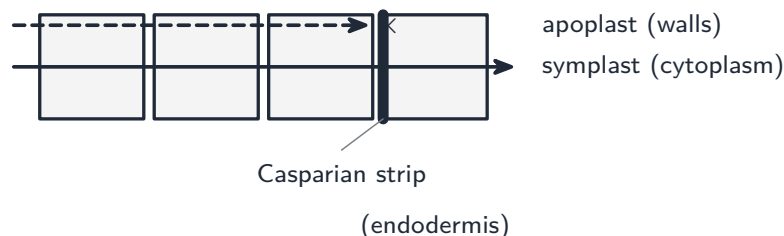


■ 2 Water from soil to xylem

Water enters a **root hair cell** by osmosis, then crosses the root by two pathways:

- the **apoplast pathway** – through the **cell walls** and spaces, **not** through the cytoplasm (fast).
- the **symplast pathway** – through the **cytoplasm**, from cell to cell.

At the **endodermis** a waterproof band, the **Casparian strip**, blocks the apoplast. This forces water through the cell membrane, so the plant can control what enters the xylem.



Watch out: xylem is made of *dead*, hollow, lignified tubes carrying water *up*; phloem is *living* sieve tubes carrying sugars. The Casparian strip forces water through a cell membrane, so the plant controls what enters the xylem.

Practice

Try these in order.

7.1 State what each tissue carries: (a) xylem, (b) phloem.

[2]

7.2 Xylem vessels are made of dead, empty cells with no end walls. Explain how this suits their job. [2]

7.3 What substance strengthens and waterproofs the walls of xylem vessels? [1]

7.4 Name the two pathways by which water crosses the root to the xylem. [2]

7.5 The Casparian strip blocks the apoplast pathway at the endodermis. Explain why this is useful to the plant. [2]

7.6 What is the role of the companion cell next to a sieve tube? [1]

7.7 Challenge. Xylem vessels are dead and hollow, but phloem sieve tubes are living. Explain why each suits its transport job. [2]