

7 Transport in plants – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)		
osmosis	渗透	_____	_____	_____
tissues	组织	_____	_____	_____
xylem	木质部	_____	_____	_____
mineral ions	矿物离子	_____	_____	_____
phloem	韧皮部	_____	_____	_____
vessel	导管	_____	_____	_____
lignin	木质素	_____	_____	_____
sieve tube	筛管	_____	_____	_____
sieve plates	筛板	_____	_____	_____
companion cell	伴胞	_____	_____	_____
root hair cell	根毛细胞	_____	_____	_____
apoplast pathway	质外体途径	_____	_____	_____
cell walls	细胞壁	_____	_____	_____
symplast pathway	共质体途径	_____	_____	_____
cytoplasm	细胞质	_____	_____	_____

English	中文	Write it 3 times (English)		
endodermis	内皮层	_____	_____	_____
Casparian strip	凯氏带	_____	_____	_____

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** 渗透 (from the Cell membranes sheet).

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

New ideas

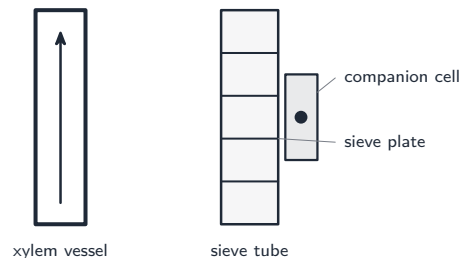
Read these first, then do the Practice.

■ 1 The two transport tissues

Plants move substances through two **tissues** 组织:

- xylem** 木质部 carries **water** and dissolved **mineral ions** 矿物离子 **up** from the roots.
- phloem** 韧皮部 carries dissolved food (mainly sugars) to wherever it is needed.

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

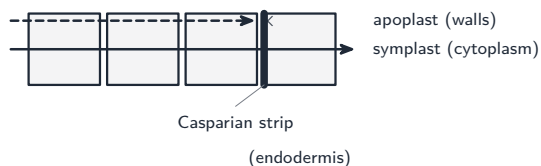


■ 2 Water from soil to xylem

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

- the **apoplast pathway** 质外体途径 — through the **cell walls** 细胞壁 and spaces, **not** through the cytoplasm (fast).
- the **symplast pathway** 共质体途径 — through the **cytoplasm** 细胞质, from cell to cell.

At the **endodermis** 内皮层 a waterproof band, the **Casparian strip** 凯氏带, 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]
