

Xylem and phloem

Revision notes · The functions of xylem and phloem, where they are in roots, stems and leaves, and how xylem vessels are adapted.

For Cambridge IGCSE Biology 0610 (and 0970, which has the same content). **Supplement** is Extended content, only examined on Papers 2 and 4.

Xylem and phloem Spec 8.1

Xylem and phloem Spec 8.1.1, 8.1.3

Plants have two transport tissues. Together they make up the vascular tissue, which runs from the roots through the stem and into the leaves.

Functions of xylem and phloem

Tissue	Function
Xylem	transport of water and mineral ions (from the roots upwards), and support for the plant
Phloem	transport of sucrose and amino acids

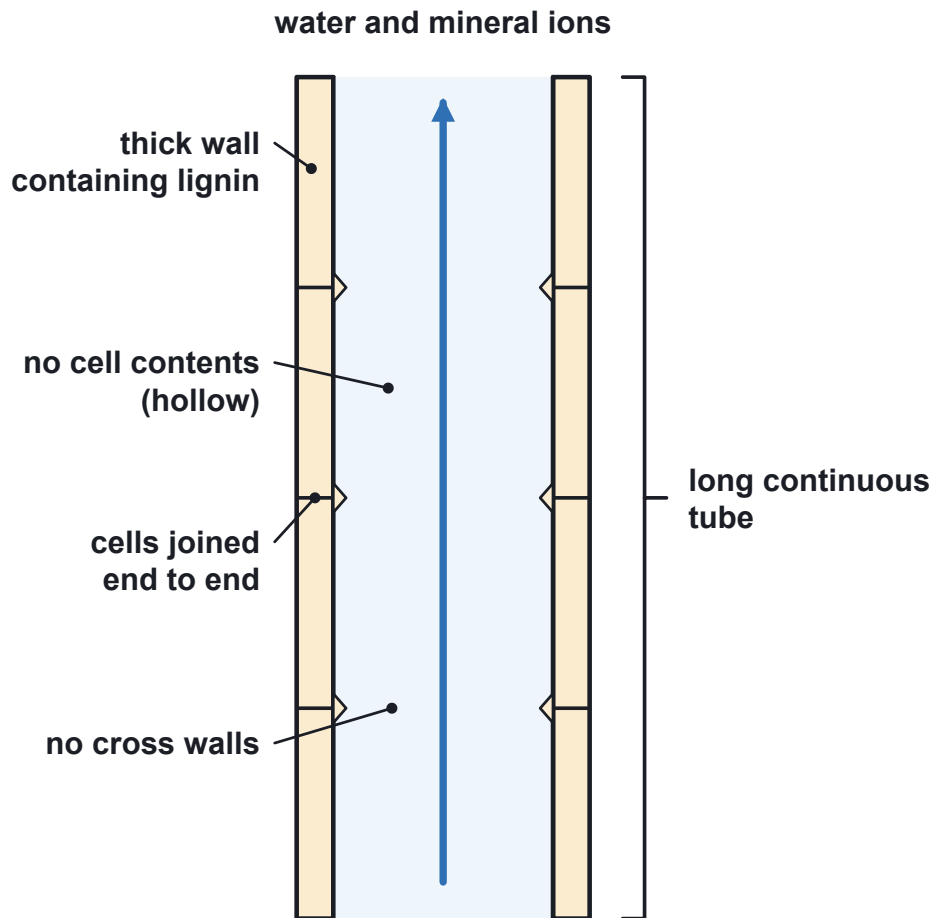
Supplement

Xylem vessels: structure and function

Supplement

Xylem vessels are adapted to carry water over long distances. Each feature links to a job.

Supplement



A xylem vessel is a **long continuous tube** of dead cells with thick, lignified walls and no cross walls.

Supplement

Structure of a xylem vessel

Feature	How it helps
Thick walls containing lignin	Strong, so the vessel does not collapse and the plant is supported. The details of lignification are not required.
No cell contents	Nothing blocks the vessel, so water flows through easily.
Cells joined end to end with no cross walls	Forms a long continuous tube , so water can move up in one unbroken column.

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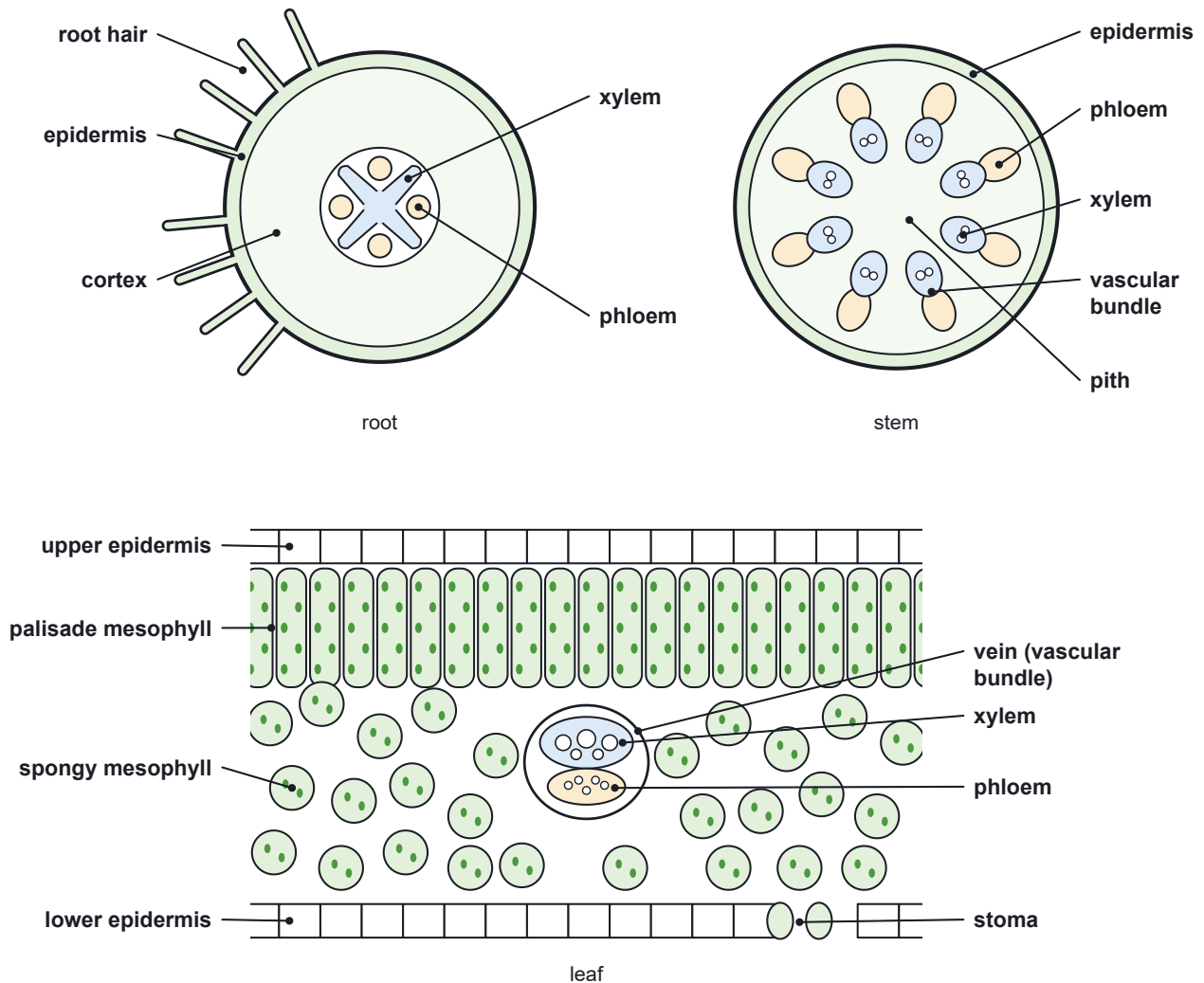
Exam tip: Always link the feature to its function. 'No cross walls' earns the mark only if you say it makes a continuous tube or lets water flow without obstruction.

Xylem and phloem in roots, stems and leaves Spec 8.1.2

You must be able to find xylem and phloem in sections of the roots, stems and leaves of a non-woody dicotyledonous plant. In all three organs they are found together, in groups called **vascular bundles** (veins in the leaf).

Position of xylem and phloem

Organ	Where the vascular tissue is	Xylem and phloem
Root	in the centre of the root	xylem in the middle, often in an X or star shape, with phloem between the arms of the X
Stem	vascular bundles in a ring near the outside of the stem	in each bundle, xylem is on the inside and phloem on the outside
Leaf	in the midrib and the veins	in each vein, xylem is on the upper side and phloem on the lower side



Root: xylem in the centre. Stem: bundles with **phloem outside, xylem inside**. Leaf vein: **xylem above phloem**.

To identify the tissues in a photograph, find the vascular bundle or vein first, then use its position to decide which tissue is which.

Common mistake: Do not mix up the order in the stem. Phloem is on the outside of each bundle and xylem is on the inside.

Quick check

- 1 . What does phloem transport?
- 2 . What are the two functions of xylem?
- 3 . In a stem, which tissue is on the outside of a vascular bundle?
- 4 . **Supplement** Why do xylem vessels have no cross walls?

Quick check answers

Xylem and phloem

- 1 . Sucrose and amino acids.
- 2 . Transport of water and mineral ions, and support.
- 3 . Phloem.
- 4 . The cells are joined end to end to make a long continuous tube.