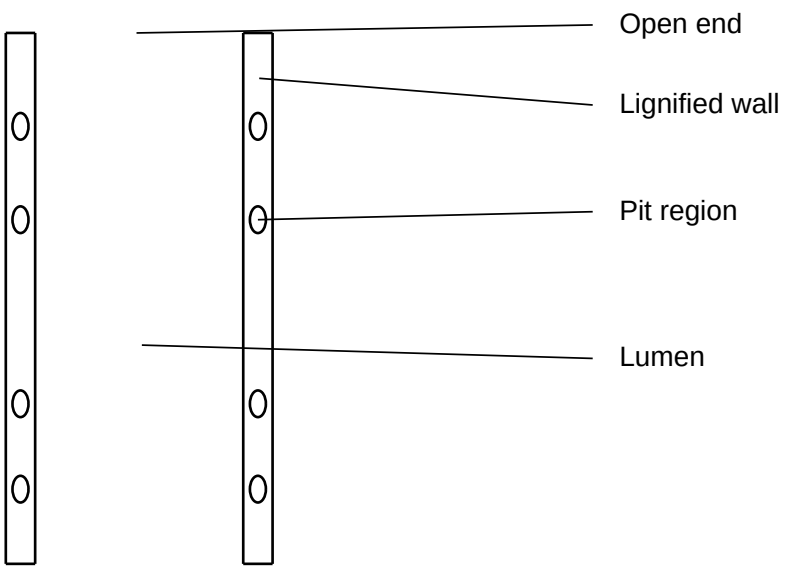
Xylem: wall, lumen and openings

Unlike a low-power plan, a cell drawing shows the shapes and visible details of individual cells. Recognise a vessel element from its wall and lumen, then reproduce the features shown in the source image.

1. ONE VESSEL ELEMENT: LONGITUDINAL SECTION



Schematic cutaway of a pitted vessel element with simple open ends. Pits are regions without secondary-wall thickening; a thin primary-wall barrier remains. They are not sieve pores.

2. VESSEL ELEMENT IS NOT THE WHOLE VESSEL

A vessel is made from many vessel elements joined end to end. Mature conducting elements have no living cell contents. Draw the lumen as the space inside the wall; do not add a nucleus or chloroplasts.

3. MATCH THE WALL PATTERN YOU SEE

Vessel walls may show rings, spirals or pits. Do not add every pattern to one drawing. Record the actual wall thickness, outlines and visible end-wall openings. A simple open end is shown here; perforation patterns can vary.

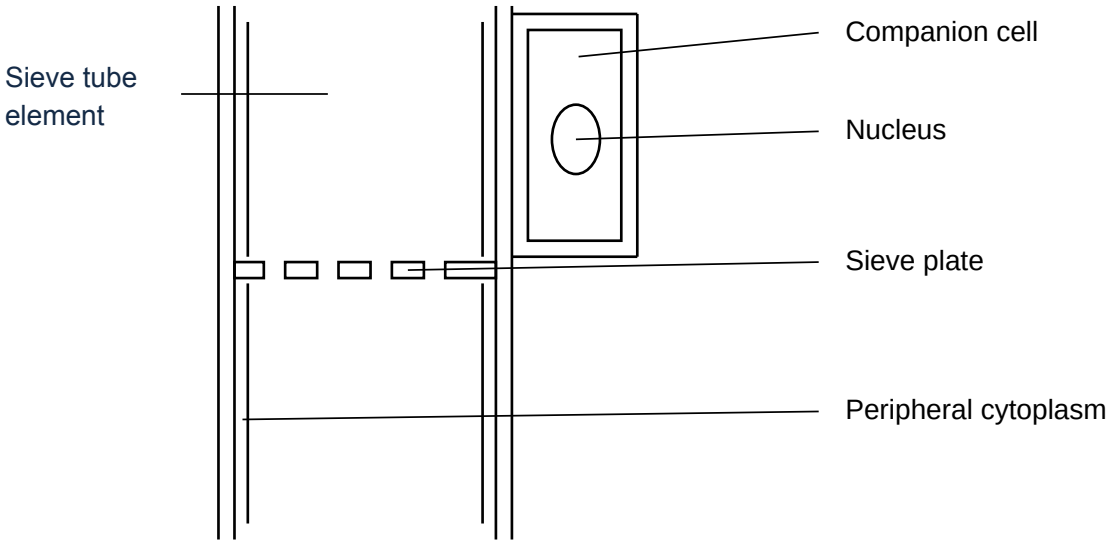
Vessel elements and perforated ends: OpenStax Biology 2e, section 30.2.
Drawing requirements: Cambridge 9700 syllabus, practical assessment, pp. 53, 55.

Scope: Cambridge Biology 9700 syllabus, section 7.1, outcome 3, p. 26.

Sieve tube and companion cell

Sieve tube elements join end to end. Their shared end walls form sieve plates with pores. Companion cells lie alongside and retain a nucleus; mature sieve tube elements are living but lack a nucleus.

1. LONGITUDINAL VIEW: TWO DIFFERENT CELL TYPES



Schematic section; the sieve tube continues beyond the frame. Gaps in the shared plate represent pores. The companion cell is a separate cell, not part of the sieve tube lumen.

2. DO NOT CONFUSE THE TWO CELLS

The sieve tube element has reduced contents, not a dead, empty xylem lumen. Its companion cell has a nucleus and metabolically active cytoplasm. Connections through their shared wall support exchange between the cells.

3. LET THE IMAGE SET THE LEVEL OF DETAIL

A clear nucleus can help identify a companion cell. Mitochondria and fine connections may be resolved in electron micrographs, but are not automatically visible in a light-microscope image. Do not invent organelles in an observational drawing.

Sieve elements, pores and companion cells: Kalmbach & Helariutta (2019).
Drawing requirements: Cambridge 9700 syllabus, practical assessment, pp. 53, 55.

Scope: Cambridge Biology 9700 syllabus, section 7.1, outcome 3, p. 26.

Draw what the image can support

Use the section orientation and image resolution to decide what can be drawn. These teaching schematics explain identities; they do not replace the particular slide, photomicrograph or electron micrograph you are given.

1. CHECK THE VIEW BEFORE NAMING A FEATURE

A transverse section cuts across the cells: outlines and wall thickness are useful. A longitudinal section cuts along them: length and end walls may be visible. A sieve plate will not appear in every section. Absence from the image does not prove absence from the cell.

2. RECORD SHAPE, SIZE AND CONTACTS

Draw the requested cells large enough to show detail. Preserve their relative sizes and the way neighbours touch. Show visible wall thickness with two outlines; where two walls meet, a shared boundary may give three lines. Do not leave a gap between cells that touch.

3. LABEL THE STRUCTURE PRECISELY

A wall label ends on the wall, not in the lumen. A sieve-plate label ends on the end wall between elements. A nucleus label ends on the visible nucleus, not just somewhere in the companion cell. Keep label lines straight and avoid crossing them.

4. FINISH AS AN OBSERVATIONAL DRAWING

Use a sharp pencil and clear, unbroken lines. Avoid shading and repeated sketch strokes. Include only observable cell contents and give the section type when known. If scale is requested, use calibrated measurements or the supplied scale bar, not an invented value.

Next lesson: how these structures relate to transport and support. Here, the priority is accurate recognition, drawing and labelling.

Cell features for comparison: OpenStax Biology 2e, section 30.2.
Drawing requirements: Cambridge 9700 syllabus, practical assessment, pp. 53, 55.

Scope: Cambridge Biology 9700 syllabus, section 7.1, outcome 3, p. 26.