

Solutions

Each answer shows the steps, then the **result**.

2.1

- xylem transports **water and mineral ions** (upward)

2.2

- phloem transports **sucrose and amino acids**

2.3

- xylem: **water** or mineral ions
- phloem: **sucrose** or amino acids

2.4

- dead and hollow with no end walls: a continuous tube with little resistance
- **lignin** strengthens the wall so the vessel does not collapse

2.5

- a **source** is where sucrose is made or released, e.g. a leaf
- a **sink** is where it is used or stored, e.g. a growing root tip

3.1 B

- xylem vessels are **dead, hollow tubes with lignin walls**
- A would block flow; C is phloem-like; D is mesophyll

3.2

(a)

- extra role of xylem: it **supports the plant**

(b)

- cells are **dead and hollow**, so water flows freely
- they join end to end into one continuous **lignified pipe**

3.3

(a)

- vascular bundles form a **ring**
- **xylem inside, phloem outside** each bundle

(b)

- carried: water and mineral ions / sucrose and amino acids
- direction: **upwards only / both directions**
- cells: **dead / living**

- end walls: **absent / sieve plates**

(c)

- phloem goes from **source to sink**
- which organ is source or sink **changes**, so direction changes
- xylem is pulled **up** by transpiration only

(d)

- the bark contains **phloem**; the ring cuts it, leaving xylem intact
- sucrose **accumulates above** the cut
- **no sucrose** reaches the roots
- root cells have no glucose for respiration and **die**

(e)

- **xylem** is deeper and has not been cut
- so **water still reaches the leaves**