

Full Higher Separate content. ★ = Higher Tier. ◆ = Separate Science only.

**Q1. Describe the differences between xylem and phloem in terms of structure and function.**

[4 marks]

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**Q2. Explain how root hair cells are adapted for their function.**

[3 marks]

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◆ SEPARATE SCIENCE

**Q3. ◆ Explain how the structure of a leaf cross-section is adapted for photosynthesis.**

[3 marks]

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★ HIGHER TIER

**Q4. ★ Explain the transpiration stream and the forces that drive water movement through the plant.**

[3 marks]

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Total: 13 marks

**Q1 (4 marks)**

*Describe the differences between xylem and phloem in terms of structure and function.*

- Xylem: dead hollow cells, lignified walls — structural support and water transport [1]
- Xylem: carries water and mineral ions from roots upward only (transpiration stream) [1]
- Phloem: living cells with sieve plates [1]
- Phloem: carries dissolved sugars (sucrose) from leaves to all parts of plant (translocation) — both directions [1]

**Q2 (3 marks)**

*Explain how root hair cells are adapted for their function.*

- Long extension greatly increases surface area [1]
- Water absorbed by osmosis (soil water potential > root cell water potential) [1]
- Mineral ions absorbed by active transport (requires ATP from mitochondria) [1]

**Q3 (3 marks) [◆ Sep]**

*◆ Explain how the structure of a leaf cross-section is adapted for photosynthesis.*

- Palisade cells: near top, packed with chloroplasts, close to light source [1]
- Spongy mesophyll: air spaces allow CO<sub>2</sub> to diffuse to palisade cells [1]
- Stomata in lower epidermis: control gas exchange (CO<sub>2</sub> in, O<sub>2</sub> and water vapour out) [1]

**Q4 (3 marks) [★ HT]**

*★ Explain the transpiration stream and the forces that drive water movement through the pl...*

- Water evaporates from leaf cells through stomata (transpiration) [1]
- Creates negative pressure at the top of the xylem — pulls water column upward [1]
- Cohesion of water molecules (hydrogen bonding) maintains continuous column from roots to leaves [1]