

# Edexcel (B) Biology A-level

## 4.7 - Transport in plants

### Flashcards

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Relate the structure of xylem to their function.



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- Long, continuous columns made of dead tissue, allowing transportation of water.
- Contain pits, allowing water to move sideways between vessels.
- Thickened with a tough substance, providing structural support.



Relate the structure of phloem to their function.



Relate the structure of phloem to their function.

- Sieve tube elements transport sugars around the plant.
- Companion cells designed for active transport of sugars into tubes.
- Cytoplasm linked by plasmodesmata, allowing flow of substances between cells.



Explain what is meant by the apoplastic pathway.



Explain what is meant by the apoplastic pathway.

Water moves through the cell walls and intercellular spaces by mass flow. This pathway can only be used until water reaches the Casparian strip.



Explain what is meant by the symplastic pathway.





Explain what is meant by the symplastic pathway.

A method of osmosis through the root hair cells, where water moves through the cytoplasm. To begin this pathway, water must be actively transported into cells.



Explain the cohesion-tension theory.



Explain the cohesion-tension theory.

Water molecules form hydrogen bonds with each other, causing them to 'stick' together (cohesion). The surface tension of the water also creates this sticking effect. Therefore as water is lost through transpiration, more can be drawn up the stem from the roots.



# How does root pressure affect water movement?



## How does root pressure affect water movement?

High mineral content gives the root a low water potential, meaning there is strong osmotic flow into the roots. This creates a weak push effect, moving water from the roots into the stem.



# How does temperature affect rate of transpiration?



How does temperature affect rate of transpiration?

A higher temperature increases random motion and rate of evaporation, therefore increasing rate of transpiration.



# How does light affect rate of transpiration?





## How does light affect rate of transpiration?

A higher light intensity increases rate of photosynthesis, causing more stomata to open for gas exchange, therefore increasing rate of transpiration.



# How does humidity affect rate of transpiration?



## How does humidity affect rate of transpiration?

High humidity means the water content of the air next to the leaf is high. This reduces the concentration gradient, therefore decreasing rate of transpiration.



# How does air movement affect rate of transpiration?



How does air movement affect rate of transpiration?

Large amounts of air movement blow moist air away from the leaves, creating a steep concentration gradient.

Therefore increases rate of transpiration.



Summarise the mass-flow hypothesis of translocation.



Summarise the mass-flow hypothesis of translocation.

- Sugar loaded into sieve tubes via active transport.
- Lowers water potential, causing water to move in from xylem.
- Hydrostatic pressure causes sugars to move.



Give evidence for the mass-flow hypothesis.





Give evidence for the mass-flow hypothesis.

- Sap is released when a stem is cut, therefore there must be pressure in the phloem.
- There is a higher sucrose concentration in the leaves than the roots.



Give evidence against the mass-flow hypothesis.



Give evidence against the mass-flow hypothesis.

- Not all solutes move at the same speed.
- There is bidirectional movement in the sieve tubes.

