

Question 28 (Answer: **A**)

- Water crosses the root cortex down a water potential gradient.
- Through the cell walls that is the apoplast pathway – effectively diffusion.
- Through the cytoplasm from cell to cell it is osmosis down the gradient.

Question 29 (Answer: **C**)

- At a sink the sucrose is unloaded from the sieve tube.
- Removing solute makes the water potential *higher* (less negative).
- Water then leaves the sieve tube by osmosis, so the volume decreases.

Question 29 (Answer: **C**)

- Transpiration pulls water up the xylem, putting the water column under *tension*.
- Tension is a negative pressure.
- Root hair cells must have a water potential lower than the soil solution for water to enter them.

Question 30 (Answer: **B**)

- Cohesion is attraction between water molecules themselves.
- Adhesion is attraction between water and the xylem wall.
- Evaporation from the leaf creates the tension that pulls the column up.

Question 31 (Answer: **C**)

- Loading sucrose at the source lowers the water potential inside the sieve tube.
- Water then follows by osmosis, raising the hydrostatic pressure.
- Sieve tubes are never lignified – that is a xylem feature.

Question 29 (Answer: **D**)

- The symplast route passes from cytoplasm to cytoplasm through plasmodesmata.
- So it does *not* cross a phospholipid bilayer between adjacent cortex cells.
- The apoplast route goes through the cell walls until the Casparian strip forces it into the symplast.

Question 30 (Answer: **A**)

- Unloading amino acids at a sink removes solute from the sieve tube.
- That raises the water potential (makes it less negative).
- Water then leaves by osmosis, so the volume of liquid falls.

Question 28 (Answer: **A**)

- The apoplast pathway is the route through the cell walls and the spaces between them.
- It does not enter the cytoplasm at all.
- Plasmodesmata and vacuoles belong to the symplast and vacuolar routes.

Question 30 (Answer: **B**)

- Loading at the source and unloading at the sink creates a hydrostatic pressure gradient.
- Water follows the sucrose in by osmosis at the source, raising the pressure there.
- The sap therefore flows from source to sink down that pressure gradient.

6(a)	<i>any two features for sink = 1 mark</i> leaf is a sink when - it is growing - it is, immature / young / developing / new A before it is mature - it is not (yet) photosynthesising / cannot make its own sugars / cannot make its own organic compounds / named receives, assimilates / photosynthates / organic compounds / named - it needs energy(-containing compounds) <i>any two features for source = 1 mark</i> leaf is a source when - it is mature / not young / developed - photosynthesising / synthesising assimilates / AW - translocating assimilates / described e.g. provides assimilates / named, to, other parts of the plant / sinks I starch if other correct named, otherwise R <i>one mark if only 1 correct feature for sink and 1 correct feature for source</i>
6(b)	B = 2 ; C = 4 ; D = 3 ; E = 1 ; A 2 A 1 and 2