

## Model Answers: Hard

### Q1

The correct answer is **D** because:

- Osmosis is the diffusion of water molecules from a region of high water potential to an area of lower water potential, through a partially permeable membrane.
- The less concentrated a solution is, the higher the water potential will be in the solution.
- The 0.2 mol per dm<sup>3</sup> salt solution is less concentrated than the solution inside the potato cells, so has a lower water potential.
- We can tell this as after 24 hours the length of the potato cylinder has increased in mass because the potato cells have gained water.

Remember when we refer to how concentrated a solution is, we're usually referring to the concentration of solutes (salts or sugars) within the solution.

### Q2

The correct answer is **D** because:

- 1 shows the movement of water from cell to cell. Osmosis is the special diffusion of water molecules from a region of high water potential to a region of lower water potential, through a partially permeable membrane. This means that osmosis occurs when water is moving into or out of a cell.
- 2 shows the evaporation of water from the surface of a spongy mesophyll into an air space inside the leaf.
- 3 shows the diffusion of water vapour (a gas) out of the leaf through the stomata.

Steps 2 and 3 collectively are termed 'transpiration'. This process drives the movement of water up through a plant from the roots.

### Q3

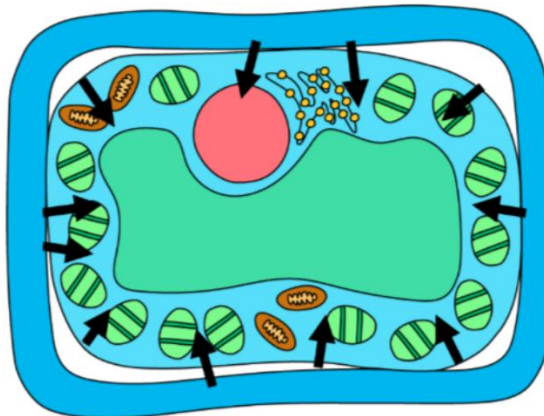
The correct answer is **C** because:

- Water will move by osmosis - the diffusion of water molecules from a region of high water potential to a region of lower water potential, through a partially permeable membrane.
- Pure water will have a higher water potential than inside the beetroot cells, so water will move into the cells (they may become turgid), increasing the mass of the beetroot piece.
- The concentrated salt solution will have a lower water potential than the beetroot cells, so water will move out of the cells and (they may become flaccid), decreasing the size of the beetroot piece.

Q4

The correct answer is **B** because:

- The potato cylinder decreased in length therefore it must have lost water to the solution by osmosis.
- Water moves from a dilute (less concentrated) solution to a more concentrated solution, so the solution in the potato must be more dilute.
- A salt solution with a concentration of 0.0 has no solute in it (so is pure water); therefore B is correct.



Q5

The correct answer is **D** because the membrane is fully permeable, so the water and solute molecules can move according to their concentration gradients.