

Question 5 (Answer: D)

- A potato stick gains length in a solution of higher water potential and loses length in a lower one.
- Pure water gives the greatest gain; the most concentrated solution gives the greatest loss.
- So rank the four by concentration to predict which changed by how much.

Question 6 (Answer: A)

- A cylinder gains length in a solution of higher water potential and loses length in a lower one.
- The concentration where the length does not change is where the two water potentials match.
- So plot the change against concentration and read off where the line crosses zero.

Question 7 (Answer: A)

- A potato cylinder gains mass in a solution of higher water potential than its own, and loses mass in a lower one.
- Pure water has the highest water potential, so the cylinder in it gains the most.
- The more concentrated the sugar solution, the more mass the cylinder loses.

Question 3 (Answer: C)

- A lower water potential outside means water leaves the cell by osmosis.
- The vacuole shrinks and the cytoplasm pulls away from the cell wall – plasmolysis.
- So the cells lose water and become flaccid, then plasmolysed.

Question 7 (Answer: D)

- Distilled water has a higher water potential than the potato cells' contents.
- So water moves *into* the cells by osmosis.
- The cube therefore gains mass, ending up slightly heavier than 5 g.

5(a)(i)	<i>any four from:</i> 1 <u>active transport</u> ; 2 (movement of particles / nitrate ions) from a low concentration to a high concentration / against OR up the concentration gradient OR there are more (nitrate) ions in the cell / root hair than the soil ; 3 pass, through / across, cell / partially permeable, membrane ; 4 using protein, carriers / molecules ; 5 using energy (from respiration) ;
5(a)(ii)	lightning and (nitrogen fixing) bacteria ;
5(b)	osmosis ;

5(c)

*total of five from:**differences to max 3:**root hair cells have:*

- 1 nucleus / nuclear membrane ;
- 2 mitochondria ;
- 3 (large permanent) vacuole ;
- 4 cellulose cell wall / cell wall made of a different substance ;
- 5 linear DNA ;
- 6 no plasmids ;
- 7 AVP ;

similarities to max 3:

- 8 cell wall ;
- 9 cell membrane ;
- 10 cytoplasm ;
- 11 DNA / genetic material ;
- 12 ribosomes ;
- 13 AVP ;

1(a)(i)	25 and 25 (cm ³) ;
1(a)(ii)	102 ±1 (mm) ;
1(a)(iii)	table drawn with a minimum of three columns and a header line ; suitable headings with correct units for concentration and length ; five correct lengths recorded that match the salt solution concentration ;
1(a)(iv)	S1 : 8 (mm) and S2 : 5 (mm) (S3 matches candidate's measurement) ;
1(a)(v)	<i>any one from:</i> the higher the concentration (of salt), the, more / faster, osmosis occurs ; the higher the concentration (of salt) the more water, is lost / moves out ; water move out of the, potato / disc(s), in salt solution(s) ; water moves into the, potato / disc(s), when there is no salt / in pure water / in 0 mol dm ³ ; the solute concentration of the potato (cell(s)) is between 0.5 mol dm ³ and 0 mol dm ³ ;
1(a)(vi)	length (of discs) ;
1(a)(vii)	<i>any one from:</i> change / difference, (in one disc) too small (to, measure / see) / ora ; one disc may not be, representative / typical ; decreases / reduces, percentage error / AW ; reduces the effect of anomalous results ;
1(a)(viii)	cut, on a tile / on a flat surface / away from hand or body / AW ;

1(b)	<i>solution:</i> iodine (solution) and <i>conclusion:</i> starch present ;
1(c)(i)	Outline is a single clear line with no shading ; Size –at least half the available space used ; Detail 1 : midrib as a double line for at least half its length ; Detail 2 : four bumps across the base of the leaf (two on either side of the petiole and two bulges at the edges) ;
1(c)(ii)	PQ = 63 ± 1 (mm) ; ($\times$) 1.6 ;;

1(c)(iii)	one difference from: ;		
	(potato / Fig. 1.5)		(tomato / Fig. 1.6)
	more veins	OR	fewer veins
	veins more branched	OR	veins less branched
	(outline / side / edge is) smooth / even / not lobed	AND	(outline / side / edge is) uneven / lobed / wavy / jagged / bumpy
	single / undivided / not lobed ,leaf	AND	divided leaf / leaflet / lobed (at bottom)
	symmetrical	AND	not symmetrical / irregular shape
one similarity from: ;			
• (both have) veins / midrib • (both have) a (leaf) stalk / stem / petiole • (both have) a pointed tip			

Question 5 (Answer: B)

- Water always moves from a higher water potential to a lower one, by osmosis.
- In a transpiring leaf water is being pulled towards the air spaces and out of the stomata.
- So follow the direction of increasing solute concentration through the four cells.