A-Level Biology: **w25 11**

Question 16 (Answer: **B**)

- Distilled water has a higher (less negative) water potential than the cell contents.
- So water moves in, down the water potential gradient, by osmosis.
- Osmosis is passive – no active transport and no movement of solutes is needed.

Question 17 (Answer: **B**)

- Halving every dimension divides the volume by 8 but the surface area by only 4.
- So the surface area to volume ratio *doubles*.
- A larger ratio means the dye diffuses to the centre faster.

Question 18 (Answer: **D**)

- Cells shrink in a solution of lower water potential and swell in one of higher water potential.
- Compare each cell type's response in each solution to rank the water potentials.
- Whichever solution changes both cell types the same way is the one furthest from their internal water potential.

A-Level Biology: **w25 12**

Question 19 (Answer: **D**)

- A larger cube has a smaller surface area to volume ratio.
- The dye has further to diffuse and relatively less surface to enter through.
- So the slowest cube is the one with the lowest surface area to volume ratio.

A-Level Biology: **w25 13**

Question 19 (Answer: **A**)

- Channel proteins let water-soluble ions through, and carrier proteins move glucose – 1 and 2 are right.
- Oxygen is non-polar and small, so it passes straight through the phospholipid bilayer – 3 is right.
- Glycoproteins act in recognition and attachment, so that statement holds too.

Question 20 (Answer: **C**)

- Compare the surface area to volume ratio of the two cylinders.
- The dye must diffuse from the outside to the centre, so what matters is the *distance* to the centre.
- The cylinder with the smaller radius has the shorter diffusion path, so its centre colours first.

A-Level Biology: **w25 14**

Question 17 (Answer: **C**)

- Distilled water has a *higher* water potential than the cell contents, so statement 1 is the wrong way round.
- Water enters the red blood cell by osmosis and the cell swells.
- A red blood cell has no cell wall to resist the pressure, so it bursts.

Question 18 (Answer: **C**)

- Work out the missing quantity for each cell from the figures given.
- Then form the surface area to volume ratio for both.
- The cell with the larger ratio exchanges materials more efficiently for its size.

A-Level Biology: **w25 23**

1(a)	*letter **A**: example of substance* = carbon dioxide / oxygen **;** *letter **D**: type of movement* = active transport **;** *letter **D**: part of membrane involved* = carrier / pump, protein and *example of a substance* = sodium ions **;** **R** sodium-potassium pump **A** potassium ions / chloride / amino acids **A** sodium pump (if sodium is example) **A** glucose *if not given for letter **C*** *letter **C**:example of a substance* = glucose **;** **A** amino acids / chloride (ions) / potassium ions / sodium ions *part of membrane involved*: *for **B*** = channel protein and *for **C*** = carrier protein **;**
1(b)	*any **two** from* *viruses travel through* symplast pathway **;** **I** apoplast pathway *if described correctly* **R** symplast and apoplast pathways *if no further detail of apoplast given* plasmodesmata / cytoplasmic connections between cells **; A** strands of cytoplasm because viruses are small enough (to pass through plasmodesmata) **;** AVP **; A** any *ref. to* actual size (width of plasmodesmata ~ 50 nm, width of Tobacco Mosaic Virus 18 nm)

A-Level Biology: **w25 54**

<table>
<tr><td>1(a)</td><td>any sensible concentrations ;
corresponding volumes of distilled water and sucrose;</td></tr>
<tr><td>1(b)</td><td><i>any seven from:</i>
1 same / stated, variety / age / AW, of beetroots ;
2 remove the outer skin (of the beetroot) / AW ;
3 same / stated, dimensions / AW, of (beetroot) block / AW ;
4 <i>ref. to</i> apparatus for obtaining same size of (beetroot) blocks ;
5 for each sucrose concentration, place (beetroot) block in a suitable container and submerge / AW (in sucrose solution);
6 (for each sucrose concentration) measure the initial mass and the final mass ;
7 (measure final mass) after a (suitable) stated time ;
8 method to remove excess liquid from beetroot (before measuring final mass) ;
9 use at least three different (beetroot) blocks and calculate a mean, for each sucrose concentration ;
10 safety comment with named hazard and risk and precaution ;
<table>
<tr><td>hazard</td><td>risk</td><td>precaution</td></tr>
<tr><td>beetroot</td><td>allergy / irritant</td><td>gloves / mask / PPE</td></tr>
<tr><td>knife / scalpel / cork borer / AW</td><td>cut</td><td>cut away from the hand / cut onto a, board / tile / AW</td></tr>
</table></td></tr>
<tr><td>1(c)(i)</td><td>1 appropriate axis labels and units ;
2 sketch shows decreasing line crossing <i>x</i>-axis ;</td></tr>
<tr><td>1(c)(ii)</td><td>(identify the) <i>x</i>-axis intercept point
or
(identify the point on the <i>x</i>-axis where the mean) percentage change in mass is zero ;</td></tr>
<tr><td>1(c)(iii)</td><td>rinse (beetroot) blocks (after cutting / before adding to sucrose solution) ;</td></tr>
</table>